AGRICULTURAL ENGINEERING

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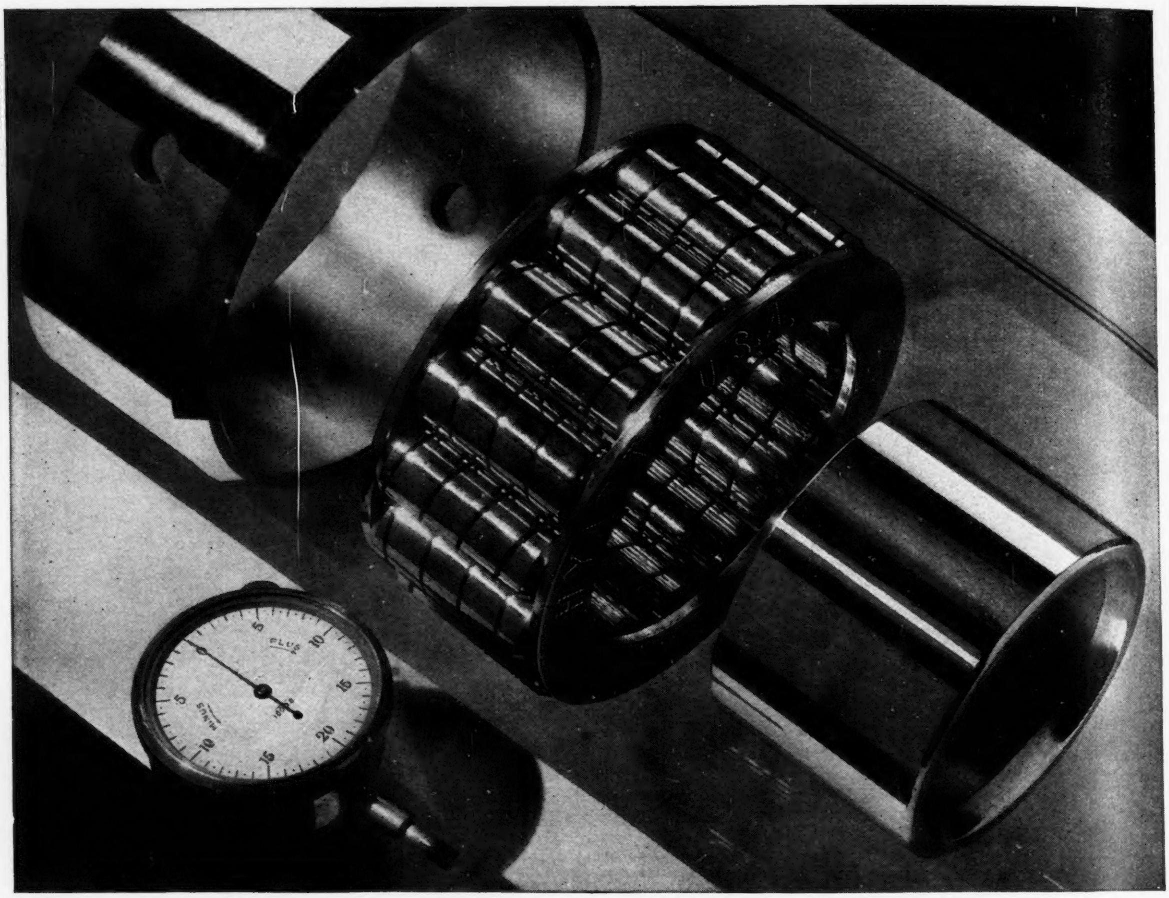

AGRICULTURAL ENGINEERING

Volume 13 JULY, 1932 Number 7

Agriculture's Challenge to the Engineer

The Annual Address of the President of the American Society of Agricultural Engineers[1]

By Leonard J. Fletcher[2]

LEONARD J. FLETCHER

AGRICULTURE is being helped. This great industry has been declared very ill by her many friends and relatives (some very distant). They are all thinking up first-aid remedies and insisting that the patient try their patent cures.

Some are certain that agriculture is suffering from over-efficiency; too much food is being produced without enough work. Others feel that we should not have interfered with the playful habits of insect pests and diseases, but that they should have their toll and thus effectively reduce this will-of-the-wisp known as the "surplus." Perhaps it was all a mistake to develop higher yielding varieties of plants, to produce livestock more efficient in the translating of feed into meat, eggs and milk, or to perfect methods of growing crops in semi-arid regions.

Many have the idea that the farm is the ideal place for all those who are not now employed. They picture vast numbers of entirely tenantable, yet vacant, farm houses. The unemployed city dweller is simply to arrive with his family, move in, and then start gathering the garden produce, milk the cows, collect the eggs, and live a completely self-contained life from then on. Others are certain that we must do everything possible to retire marginal and submarginal lands. These lands should not have been opened to settlement in the first place, and now the government should get them back into trees, grass, or scenery as rapidly as possible. Then, of course, we have those among us who are recommending the magic touch of the government to cure every evil. Prices are to be raised, surplus controlled, and everything worked according to a plan—unless something happens. And happen it does.

In most cases these plans and ideas are the honest conviction of those who propose them. Some of the recommendations are theoretically sound but unworkable, some just unworkable. Agriculture has successfully fought her enemies. She may have to be saved from her friends.

But out of it all comes a cry for clear thinking, facts, and direction based upon experience and sound judgment. Here is work for the agricultural engineer. When other than technical problems in his field come to his attention, it is a habit of the engineer to look on; to sit on the sidelines and discuss with his fellows the folly of this and that which he observes. Engineering is a method of solving problems wherein established facts are utilized, and variables are recognized as variables.

The engineer does not demand proof through the study of many typical working examples before he will go ahead and design or recommend; nor is he visionary to the extent that nothing existing is good. The world has had so much for the engineer to do that he has not taken time to try to develop in others the engineering method of analysis. Instead of laughing, however, at the political scheme, or poking holes in the social plan, he should do his share by constructively applying his training to the solution of today's problems.

The period ahead will demand much of the engineer. The face of the earth will be changed for better transportation, flood control, insurance of adequate food supply, and better health or comfort of its inhabitants.

The mechanical production of agricultural products is one of the greatest engineering achievements the world has ever seen. Regardless of the temporary criticisms of the uninformed, those men can well be proud of their achievements who have had a part in bringing about this great development. To abolish human slavery was a wonderful accomplishment, but to relieve the human being from the drudgery of the hand production of crops was a far greater and more lasting contribution to the welfare of humanity. In addition to the elimination of extreme physical exertion, mechanical production has also reduced the costs of production, insured an ample supply of food and clothing, and made possible, through the releasing of millions from labor in the fields, the building up of our great cities with their industries and trades, transportation systems, universities, and in fact that which is known as modern or desirable in our present civilization. Before one recommends a return to hand production in agriculture he must be prepared to justify the utter destruction of all that this released time and energy has accomplished. Engineering progress, however, will not be stopped; it can only be hindered by aggravating laws or unsound ideas popularized by skillful publicity.

ACCOMPLISHMENTS OF MECHANIZED AGRICULTURE

Since the beginning of agriculture, we have had to contend with an ever-increasing army of insect pests and diseases. They are now largely controlled by the machine. Little does the average consumer of farm products realize the battle waged by the farmer with the ever-increasing numbers and varieties of insect pests and crop diseases. Sprayers and dusters are continuously at work to protect the fruit and vegetable crops. Quick planting of grain after

[1]Before the 26th annual meeting of the Society at Ohio State University, Columbus, June 1932.

[2]Agricultural Engineer, general supervisor of agricultural sales, Caterpillar Tractor Company. Mem. A.S.A.E. President of the Society, June 1931 to June 1932.

fly-free dates defeats the Hessian fly. Clean cultivation discourages other pests. So we have more need for power —for work done better and more quickly. Is it not entirely possible that some of the early races of the earth, after establishing themselves in an area and devoting their energies to crop production, were eventually destroyed, or forced to migrate, because of their inability to cope with the pests and diseases which always come when like crops are intensively produced? And we are advised to adopt subsistence farming! What wonderful news for the potato bug and the Hessian fly.

Erosion is taking an increasing toll, which to control by hand is inconceivable. We have recently been informed that the great Mayan civilization of Central America was destroyed by the erosion of the soil from their cultivated hillsides.

MACHINERY AND LABOR EFFICIENCY

We are today farming millions of acres where hand methods could produce nothing, owing to the limited or highly seasonal rainfall, and the necessity for quickly accomplishing the various operations in the production of the crop.

What machinery has done to increase the effectiveness of labor in crop production has been the object of many studies. Agricultural engineers are brought up on such reports. In the October 1931 issue of the Monthly Labor Review, issued by the U. S. Department of Labor, there is a splendid summary of the mechanization of agriculture. This report states that "the average increase in efficiency per unit of labor applied in the growing of five principal crops—corn, cotton, hay, potatoes, and wheat—by the substitution of the most efficient machines and methods for the earlier hand tools and hand methods, is approximately 1,200 per cent, and the labor displacement 80 per cent."

One of the outstanding examples of increased efficiency is that of the large type combine over the sickle and flail in the harvesting and threshing of grain. The gain in efficiency per unit of labor is 4,700 per cent and the labor displacement 98 per cent. The United States Census showed 1,700,000 fewer workers on the farms of the United States in 1920 than in 1910, yet during this period there was an increase in the quantity of each of the important cereal crops. This increase was as high as 30 per cent in the case of wheat. A century ago the production of an acre of wheat required 60 hours of human toil. Today the labor requirement per acre has been reduced to as little as 54 minutes of man labor. The average for a modern mechanized wheat farm is from 2 to 4 hours per acre.

It is entirely possible that, if all the people in the United States were tomorrow furnished with the simple hand tools of agricultural production, which were in common use not much over a hundred years ago, within less than five years this country could not produce enough to feed ourselves. The American farmer today utilizes animal and mechanical energy to the extent of at least 110,000,00 horsepower hours per day during the one hundred most busy days of his tillage, planting, and harvest seasons. This is so much more power than it would be possible for all the able-bodied inhabitants of the United States to produce daily with their own muscular energy that the result would be such a great reduction in the food supply that the entire nation would be constantly bordering on starvation.

This is actually true today of peoples depending solely on hand production. They face either ever-recurring periods of starvation or the necessity for the importation of foodstuffs. China, in her fertile densely populated lowlands, presents small, well-tilled high acre-producing farms. Three-fourths of the people live on these farms, yet the remaining one-fourth in 1929 had to purchase from the outside world over $71,000,000 worth of rice, wheat and flour alone. Quoting from an article by Horticulturist G. Weidman Groff, which appeared in the August 1931 number of the Lingnan Science Journal of Lingnan University, Canton, China, he states concerning Chinese agriculture:

> "The intensive farming practiced on the lowland areas with their teeming population, together with the lack of sufficient fuel supply for these people, results in an ungoverned and disastrous encroachment of the surrounding hilly areas for the subsidiary means of support. The cutting of the vegetation for fuel, the burning of the grasslands for ashes to fertilize the fields below, and the less destructive grazing of cattle are common practices of the South China farmer which are far from efficient in a country where the physical nature of the soil is generally good, where the rainfall averages 60 inches, and where the annual mean temperature along the coast is 63 degrees (Fahrenheit), though somewhat lower inland. This utilization of the so-called dry-lands of the 'Two Kwang' provinces has resulted in the destruction of the formerly luxuriant cover of natural vegetation. . . . . .
>
> "It is readily seen that one of the major problems confronting China today is that of making the nation self-sustaining in food supply, and at the same time providing sufficient agricultural products for export, thereby maintaining a favorable balance of trade. This must be accomplished in the face of keen competition from other countries where staple crop production is organized in large units, where capital is readily available, where machine methods of production are effectively in operation, and where scientific agriculture is encouraged through large government appropriations for research. Moreover, this transition from an anti-

Improvement in efficiency of agricultural production is the problem of every individual farmer and not of the entire industry as a unit

quated to a modern type of agriculture must be accomplished in a relatively short time, and in the face of a rapidly expanding industrial development which will draw labor from the land. Fortunately, the potential possibilities for agriculture in China are unparalleled, particularly in the southern areas where climate, including copious rainfall, is favorable for crop production; where extensive undeveloped land areas are especially adapted to modern upland and hill culture; where suitable crops acclimatized to the area are already firmly established; and where intelligent farm labor is abundant. In this connection the question naturally arises as to what extent modern machine methods of agriculture can be applied to the area. . . . .

"Food production per capita, and not per unit of area, is now the national problem, and unless she is able to solve it, China will no longer be able to maintain a strong position, in spite of her cheap labor, when competing with other countries in the production of the world's raw food products. While it is true that in many places in China, and particularly in the fertile soils of the Canton Delta, production per unit of area ranks very high, due largely to the patience and perseverence of the farmers, nevertheless close analysis reveals that when production is estimated upon a basis of man power, these same areas are among the lowest in the world."

My observations are that the more completely an agriculture approaches a 100 per cent hand economy in production, the more closely its producers crowd together on the richest soils, most easily worked and generously watered, and engage themselves in a hopeless struggle with starvation and pestilence. The relatively nearby presence of other soils, capable of high production when using the more efficient type of power farming methods and transportation systems, is of no avail. An individual, or a nation, must be able to draw upon an agriculture which is producing more than is needed by the growers themselves before there can be social or industrial progress. Perhaps China, at one time, produced a surplus of food and some philosopher figured out how she could have more by producing less.

We hear much of this villian among words, "depression." Depression is a relative term and has to do with two standards of living—the one we want, and the one we are being depressed into. The Chinese farmer fears no depression because there is no lower standard possible. He has only to fear a flood, or a famine, which removes his pitifully small supply of food resulting in a negative standard of living or starvation. There are some, in this country, praising that type of farming which can operate on a minimum of cash outlay. They state that, regardless of relative efficiency in crop or livestock production, the farmer, who can produce the elemental necessities of food, shelter, and clothing for himself and his family, can resist low prices longer, thus starve out the mechanized or specializing farmer, who, with average prices, can produce for less.

THE LOW INVESTMENT FALLACY

As we look ahead along this road, we can see a still further reduction of cash outlay by the removal of mechanical power first, and then of animal power, which itself calls for some cash outlay, and the substituting of hand labor. A spading fork costs less than a horse-drawn plow; a hoe less than a cultivator; a cradle less than a binder; a flail less than a threshing machine. The end of the road leads into a complete hand production. This, to some, would solve many of our problems. There would be an absolute minimum of cash outlay. The farmer would eat nearly all he could produce. Agriculture would be completely depression-proof; there would be no lower level. He would buy so few manufactured materials there would be little need for factories, for cities, for transportation systems, for educational institutions and for tax-supported groups catering to his welfare, for there would be little to tax. Other nations have ended with this type of agriculture. American agriculture will not end in the same place, for we are planning definitely for another goal.

Past civilizations have been based on hand labor and slavery. This is the first civilization based on mechanical power. In spite of the frequent interest-arousing statement that we are being made the slave of the machine, under sane analysis this becomes absurd and ridiculous. The machine must be produced by trained minds and operated with skilled human direction. The machine can never master; it will aways serve.

There are many who feel that the leisure time which the machine has afforded the workers of the world will be the cause of their downfall. This grotesque idea is simply based on a peculiar human characteristic which causes us to see and remember the unusual, while the regular everyday facts of life go by us unnoticed. For example, five thousand automobiles may pass along a busy highway. They are filled with men engaged in business; with happy families on vacation. Let five of these cars meet some misfortune. I will leave it to you whether the headlines in tomorrow's paper will comment on the four thousand nine hundred and ninety-five safely and properly driven cars, or bring out, in newsy details, descriptions of the accidents. True there are too many automobile accidents, but why say leisure time will destroy because a few abuse the privilege? Count instead those for whom more leisure means healthful recreation, gardening, reading, resting, or other truly economic pastimes. Early civilizations based on hand production have, through many periods of pain and sorrow, worked out their methods of behavior. The engineer, however, must accept a large responsibility for the solving of the problems arising from the machine's displacement of muscular energy. After all, progress may be defined as the continuous solving of today's problems which have arisen from the solution of the problems of yesterday.

RESPONSIBILITIES OF THE AGRICULTURAL ENGINEER

There is a tendency for many people to have a misconception of the ideals of agricultural engineering. We are credited with standing for great factory farms, huge irrigation and drainage projects, the actual reducing of the human being to a part of a great machine. The fact is we stand for the orderly development and application of engineering principles to the great variety of need presented to us by the complex industry of agriculture. The family farm is today more firmly established as the most efficient producer than ever before in the history of agriculture. It is truly a family farm without the need for the great seasonal influx of itinerant laborers, or the continuous presence of a number of hired hands. For those who maintain that agriculture is not an industry, but a mode of living, it can only be said that for any desirable mode of life there must be a profit to supply those things essential for the maintaining of a happy existence.

Large-scale farms, not necessarily incorporated, have been slowly developing. Quoting from a report of the U. S. Chamber of Commerce:

"Large-scale farming, although proportionately a small part of the agricultural industry of the United States, is an established business of considerable magnitude. This fact is amply demonstrated by statistics from the income tax reports and by the records secured in this survey. Taken as a group, the large-scale farms apparently are no more, and no less, successful than the average of the family farms. Nor is there any uniformity in the success or failure of the large farms. There are fully as wide variations in the efficiency of these farms, as measured by financial returns, as in the efficiency of the small farms.

"The future development of large-scale farming in the United States is a matter of conjecture. The advantages of large-scale farming probably will increase, and the disadvantages decrease, with advances in the

mechanization of agricultural processes. But the rate of increase in the number of large farms will be contingent upon the availability of workable tracts of land in settled communities, of capital for the purchase of land, and of competent managers for such undertakings."

The large-scale farm of the future may be family operated, conducted through a cooperative group, or incorporated. Much bitter criticism has been heaped upon the head of incorporated farming. Here is clearly an indication of the popular pastime of criticizing something that is not yet developed. Is there any evidence that city employees of corporations are universally a down-trodden, defeated group? Is there impartial evidence that the country develops the highest type of physical, mental, or moral citizen? It is my observation that the city, town, and country contribute about their proportionate share of the good, bad, and indifferent to humanity. There is a constant shift from city to rural living, or vice versa. Some of this undoubtedly is a result of a desire on the part of an individual for a different environment. The people of the United States have nothing to fear from whatever type of farm organization eventually proves itself able to produce the maximum of food with the minimum of expense or labor. The welfare of the men who produce the crops of the nation should be independent of the form of organization under which they operate. Improving of efficiency in farm production through the years has in reality consisted of substitution of the machine for human toil. The farmer becomes the director of, and not the source of, the power required to plant and harvest his crops. Is this inhuman? There are too many people who like to set up specifications for human happiness (for others) and disregard entirely the everyday work of the individual, basing everything upon his so-called independence or freedom.

PRESENT AND FUTURE DEVELOPMENTS

Agriculture today is ready to accept a change. The engineer is being asked, What have you to offer? We must be careful in our recommendations, but yet courageous and willing to back up our solutions or sound opinions. To some we may have been marking time during the last few years, but under the surface there has been going on much hard, sound thinking. The foundations which are to support the great engineering developments of the coming age are being laid. We are now entering a period of temperature control for our homes and business dwellings. This means new designs in structures and the use of tremendous quantities of insulated materials. In a somewhat related way, there is also developing a frozen food industry. This may mean readjustments in the production of fruits, vegetables and livestock products. Many foods will emerge from the classification of seasonal to uniform availability the year round. There is ahead of us the usual changing problem of plant, pest, and disease control. New discoveries in pest control will largely be translated into effectiveness through new machines. Erosion, already mentioned, is being recognized in its true seriousness. This greatest waste of raw materials in this nation must be stopped. Since erosion is essentially a hydraulic problem, its control can be assured only through the application of known hydraulic principles.

The past decade has seen remarkable strides in the application of electricity to the many economic uses on the farms of America. This work is simply started. The availability of electric service to the farm is unlocking the door to the application of new engineering ideas and principles.

Every department of rural housing is finding new developments. In fact, the age ahead may develop into a great period of home building and home living for the present city dweller. After battling the crowded highways of America for the past five years, it is my opinion that nearly everyone has seen much of what other places look like. We should soon be ready to settle down in temperature-controlled homes, with the radio of today and television of tomorrow; the automobile, which will take us to work and back to our suburban dwellings, with the opportunity of using the increased amount of leisure time for healthful and profitable work in the garden or the carrying on of an avocation or hobby.

Some of the independent thinkers of this country have begun to visualize that, in place of the isolated rural dwelling, there may develop the rural community patterned somewhat after the farming villages of Europe. The engineer will view these suggestions with the open mind of a fair analyst; he will carefully evaluate and report the pros and cons.

New mechanical developments in agriculture are showing up on every hand. The developments in the use of artificial heat for crop drying; improved methods of fertilizer placement; the further uses of light, heat and power from electricity in farm production; the improvements in efficiency of tractor-operated machinery in the handling of hay crops; the approach of the completely successful mechanical cotton picker, are examples which point the way.

It has been reported that 20 per cent of all people gainfully employed in the United States are engaged in occupations which did not exist twenty years ago. In the technical papers included in the program of this, the 26th annual meeting of the American Society of Agricultural Engineers, there are ten dealing with subjects which could not or would not have found a place on any technical program twenty years ago.

The present low price of agricultural commodities is serving as a spur or stimulus to the determination of the engineer to further reduce the cost of production so that a margin of profit may more quickly return. He does not admit such a thing as an irreducable minimum in cost of tillage, planting, harvesting, processing, or transportation. Each new development is simply a step. The engineer never writes "finished" after any project.

The improvement in efficiency in agricultural production is the problem of every individual farmer and not of the entire industry as a unit. Once a crop is grown, harvested, and delivered to the door of the marketing channels, then the problems become more those of the group or mass. True, there are many vital problems which can and must be solved through cooperative or mass action; namely, legislation affecting the farmer as a class, tax adjustments, the study of marketing systems, commodity advertising, and the like. May it not be that the relative importance of these mass problems are being overemphasized because the vocal part of our agricultural "pinching shoe" belongs largely to those who must, from the nature of their positions, consider the problems of the farming industry as a whole rather than individually?

That thought-provoking book, "Harvey Baum," states that "Scientific agriculture is the salvation of the individual and the ruin of the mass." However, if the individual farmer, by himself, accepted and applied the cures or recommendations for agriculture which are based on the diagnosis of the troubles of his entire industry, might not the result be the ruin of the individual for the salvation of the mass?

A controlled volume of production, such as a 20 per cent decrease in acres planted, applied alike to the low-cost producer and the high-cost producer, depending on increasing tariff walls to hold the United States market at a high price level so all farmers may profit, would result in an about face in our agricultural production program. Any attempt to hold more people in any industry than are needed for the most economic production will result in either a need for a continuous government subsidy or a material decline in the standard of living for all those engaged in that industry. Every plan or action which will really help agriculture will be utilized more completely by the efficient farmer than by the inefficient. Any move which tends to level the economic status of an industry (or nation) to the average of the existing condition will not result in raising the level of some, but will bring all to the lowest level.

FENCE CORNER MACHINERY

Some of the spokesmen for the American farmer have developed the habit of questioning his investment in machinery. Since much of this machinery is seen standing unused in the fence corner, it is concluded that it was not satisfactory. This spokesman, or trained observer (trained because he **observes** from a **train**, does not see the years during which these machines rendered profitable service. He does not detect the usuable machine, which, for convenience during the working season, is kept in the field or yard. And this observer, in common with many others in this country, fails completely to appreciate the greatest profit which this investment in farm machinery is yet to return to this country. The American farmer, due to the pioneering spirit of his forefathers, has confidence in the new. He has accepted and used these power machines as they were being developed. He has now served his apprenticeship in the selection, use, and care of machinery and in the management of a mechanized farm. We have behind us an experience and training in the use of mechanical farm equipment, the cost of which cannot be escaped by any competing nation no matter how carefully they plan. There is no substitute for experience. The American farmer, when investing his time and money in machinery, was buying both service from the machines and training in their use. In the coming age of improved agriculture he will reap the reward of this training.

The directors of the greatest social experiment the world has ever seen, in attempting to carry out their gigantic five-year plan of accelerated progress, are finding that the universal lack of knowledge or sympathy for engineering methods among their people is proving their greatest stumblingblock. Biting criticism, inspiring oratory, prison terms, or political conjuring will not make two times two equal six, or a tractor run without lubrication.

In the showroom of one of the manufacturers of combines there is an old veteran, recently retired from service. During its 37 years of service on a western grain farm, it cut, threshed, and sacked over 1,275,000 bushels of grain. This would furnish every inhabitant of North America with bread for one meal, yet if this work-worn machine were anywhere except in the showroom, these critics would say, "There is an example of where the farmer's money has been wasted." It is true that machines have not always been good investments. There have been untrained salesmen and untrained buyers. Variable conditions have been encountered, conditions for which the machine was not originally developed.

There has never been a popular demand for any really new contribution. It has been stated that George Washington arranged the first great lighting effect when hundreds of candles were employed to illuminate the ballroom at the time of his inauguration. Many servants were required to attend to the candles. If our first president had been asked to comment on his lighting equipment, and make a demand for an improved system, he likely would have requested a candle which would not smoke, produce drippings, or need such frequent attention. Can anyone imagine his specifying that the entire room should be lighted upon the mere pressing of a button in the wall? There is no demand for the really new; it must be born in the mind of the independent thinker, encounter the criticism afforded the unproven, and finally suffer the fate of being accepted as just something that happened.

It has been said that science knows no national boundaries. The American Society of Agricultural Engineers has enrolled in other countries over fifty members. The profession of agricultural engineering is well organized in several European countries. As engineers and scientists, we must lead the way toward teamwork with our fellows in other lands. In this great scientific age ahead, people will learn to live together, to trust and not to hate. The engineer, who through great strides in transportation and communications, has brought the world together, must now help to consolidate the parts into a correlated unit.

The agricultural engineering profession has been in training for this great technical advance which now is facing all industries. In agriculture's present need for proper guidance in the solution of her problems lies one of the greatest challenges ever offered to an engineering profession.

A Welcome to Agricultural Engineers[1]

By Dr. George W. Rightmire

President, The Ohio State University

THIS ANNUAL gathering of the agricultural engineers is a very significant occasion for the University. Those present come from the most widely scattered states, reaching the borders of the country, and we are highly pleased that we can entertain you on this occasion.

This is an opportunity and an occasion for making new acquaintances and strengthening old ones, and comparing notes on methods, subject matter, ideals, and general activities. In a way also such gatherings serve as little vacations from which we return with new inspiration, some of our traditional and habitual thoughts very much unsettled, and some new suggestions which will enable us to strike out in new and promising directions in our work. Out of these acquaintances also there comes the knowledge of where the best men and women in this field of work are now carrying on and when vacancies occur, as they inevitably will, we will know at once where to go for replacements. . . . .

This meeting is an inspiration also in the exhibits which are presented by your committees. As one passes through the lower hall and display rooms, he is very much impressed with the solid character of the projects now being studied by committees, the substantial advances which have been made, and the enthusiasm which has been in evidence in all investigations during the past year.

These are verily the days of power in industry, in agriculture, and in the home. The woman of today must know a great deal about the operation of household appliances by electricity, heating and cooking by electric current, refrigeration induced by electrical means, and she must be as familiar with electricity today as her grandmother was with coal oil and matches. The boy on the farm is coming more and more to be a power engineer and must know things which were not in the wildest dreams of his grandfather.

Last summer in Cornwall, England, near Penzance, I saw a beautiful vegetable, flower, and small fruits farm, in which some very exacting work was being done by a tractor supplemented by much manual labor. The point to me was that this piece of American machinery had found its way into one of the rockiest counties of England and was there a most useful asset of the farmer. This is merely an illustration abroad of what has gone on at home on a very large scale; this is distinctly the age of power machinery and farm implements, and it is through the activities of departments of agricultural engineering like ours in all the state universities of the country that we may expect to lighten the heavy labors which used to characterize farming, to bring cheerfulness and comfort to the farm population, and, by great material improvements, make rural life and living conditions attractive. The mission of agricultural engineering is clearly indicated.

[1]Address of welcome (abridged) to the 26th annual meeting of the American Society of Agricultural Engineers at Ohio State University, Columbus, June 1932.

First McCormick Medal Award to Major Stout

MAJOR Oscar Van Pelt Stout was formally presented the first Cyrus Hall McCormick Medal of the American Society of Agricultural Engineers "for exceptional and meritorious engineering achievement in agriculture," during the annual banquet, Wednesday evening, June 22, of the Society's twenty-sixth annual meeting, at Ohio State University, Columbus.

The new medal, to be awarded annually, was made possible through an endowment established for the purpose last year by Mr. Cyrus H. McCormick, Mrs. Emmons Blaine, and Mr. Harold F. McCormick in honor of their father, the inventor of the reaper.

Major Stout's "exceptional and meritorious engineering achievement in agriculture" includes many tasks well done in a professional career which dates back to 1886. His greatest achievement, from the standpoint of its influence on agriculture and the agricultural-engineering profession, however, is believed to be his extended and successful sponsoring of the principles of agricultural engineering as a field worthy of special academic and professional attention. In this he literally became the father of the agricultural engineering profession.

OSCAR VAN PELT STOUT

An an educator he inspired and showed the possibilities of agricultural engineering to his many students, four of whom have since served terms as president of the American Society of Agricultural Engineers.

As a practicing engineer he has influenced considerably the agricultural development of the Middle West and West by his work as hydrographer; research engineer in irrigation and drainage investigations; designing and consulting engineer on many drainage, irrigation and water power works; and as an expert witness in lawsuits involving questions in his technical field.

Born near Jerseyville, Illinois, in 1865, but reared in Nebraska, on the "rim of the prairie," he graduated from the high school at Beatrice, received his bachelor's degree in civil engineering from the University of Nebraska in 1888; continued till 1890 his pregraduation railway location, construction, and maintenance work; served as city engineer at Beatrice, Nebraska, during 1890-91, a period of active pavement, sewer and waterworks construction; returned to the University of Nebraska as instructor in civil engineering; was placed in full charge of the department in 1893; became the University's chief advocate, and in 1895, its first teacher, of agricultural engineering; was granted his professional civil engineering degree in 1907; was made dean of the College of Engineering in 1912; and gave up this position in 1920 to follow his chosen specialty, irrigation engineering. He is still engaged in irrigation investigations for the U. S. Department of Agriculture and resides in Oakland, California.

During 1918-19 he also served as a Major of Engineers in the U. S. Army. Throughout his whole busy career as an educator he found time to serve in various advisory capacities in engineering practice.

He was largely responsible for the introduction of agricultural engineering into the curriculum at the University of Nebraska, for its gradual development into an independent department of the University's College of Engineering, and for the inspiration and development of its subsequent leaders, and of men who carried his influence out to other states.

Major Stout was elected to honorary membership in the American Society of Agricultural Engineers in 1928, in partial recognition of the profession's debt to him.

He also is a member of Phi Beta Kappa, honorary scholastic fraternity; Sigma Xi, honorary scientific fraternity; Sigma Tau, honorary engineering fraternity; the Society for the Promotion of Engineering Education; and the American Society of Civil Engineers. He is listed in "Who's Who in Engineering," and is the author of a number of technical articles and reports. The University of Nebraska last month conferred upon him the honorary degree of doctor of engineering.

He was chosen as first recipient of the McCormick medal by a special jury of awards of the Society, from a considerable number of nominations which it considered. The gold medal he received was designed by Mr. Fred M. Torrey, a Chicago sculptor. Designs in relief on the obverse and reverse sides symbolize the change from disspiriting toil for a bare existence which limited human progress up through part of the nineteenth century, to the invention of the reaper and the notably rapid mechanical progress and physical relief which followed.

Mr. Leonard J. Fletcher, as president of the Society, made the presentation with a brief eulogy of Major Stout, and announced that he had not been given an opportunity to prepare a paper as recipient of the medal, but that he would do so in the near future and that it would be published in AGRICULTURAL ENGINEERING.

Major Stout said that in accepting this medal from the American Society of Agricultural Engineers he was at the same time proud, thankful and humble. He praised the American Society of Agricultural Engineers as an institution, and the start it has made in molding men and progress. Citing the youth of the men who led the early development of the agricultural engineering profession, he hoped that the profession might continue to give its younger members opportunity to take as much responsibility as they will in its further development.

Then, borrowing from literature the apt dedication "To you who will understand," he gave extemporaneously and reminiscently a modest chronology of his life and of contemporary developments in farm machinery, irrigation, and other phases of agricultural engineering.

He told of the one-horse, moldboard plow which was the principal tillage implement on his father's farm in Illinois, and which was used to plow corn. He also mentioned the planting of corn by hand, due to the scarcity of corn planters, which were only in the early stages of development; the move to Nebraska when he was about 12 years old, his father taking along a new Newton sulky plow, produced by its inventor in the Illinois community they were leaving; his own turning of many miles of furrow with that plow during his boyhood in Nebraska; his following a self-rake reaper, binding the grain with straw bands; cutting bands and hand stacking at threshing time; and other machinery and practices of his early years.

In concluding he expressed himself as being in sympathy with the present growing tendency of engineers to apply themselves in field not strictly engineering, pointing out that while engineering does not offer the only approach to problems, the engineering approach is valuable in many matters other than engineering.

The Place of the Agricultural Engineer in Agricultural Extension Work[1]

By R. J. Baldwin[2]

IT IS WELL KNOWN that the agricultural-engineering group is deeply and seriously interested in agricultural-extension work and has contributed largely toward the development of extension methods and the extension program as a whole. Reports of your meetings of other years, which have been brought to me by those who have attended, have shown how practical and thorough your discussions have been. I hope that I may at least stimulate your thought along some lines and emphasize to you the breadth and importance of your field in agricultural-extension work. The subject of your place in that program is too large to cover in all its phases, but I hope we may find some helpful thought in the points which have been chosen.

Speaking in a broad way, we may agree that it is the responsibility of the agricultural engineer to make farm equipment serve a progressive agriculture and rural home life. It must have been the ancestors of the engineer who invented the crooked stick from which we have advanced to the steel plow and also from the sickle to the harvester-combine. Through this creative thinking of the engineer the water supply has been brought into the home, and wastes have been disposed of by sanitary means. More recently power has replaced human energy and has released rural people from time-consuming tasks of drudgery. This progress has been possible because the engineer has been trained to question everything and to accept nothing as the last step toward perfection.

The extension agricultural engineer must continue to look upon time-established methods and ideas with a questioning eye. For example, we have for generations built tremendously expensive dairy barns with the cows lined up in rows like soldiers, each with a fine stall equipped with all the necessities of life. With milk selling at present prices the engineer may question some of this overhead. The dairyman may well confer with the engineer for aid in attacking his problem of meeting the low-price scale with more efficiency and economy.

By questioning, the engineer has found out that to produce a high quality milk, it is not necessary for the whole barn to be sterilized or for even the whole cow to be washed at each milking. He may, before he is through with this problem, produce a system which is much more simple and which entails much less overhead expense, and at the same time produces a more uniformly unvarying high-quality article than the present standard dairy barn equipment.

In my own time on a Michigan farm we looked forward to the spring season of barn raisings. The frames were cut from the woodlots and often a portable mill cut the sheathing for sides and roof. These fine structures were 36 by 60, 40 by 70, 45 by 100 feet, and a measure of the success of the farmer was the size of barn he could build. Then the engineer came into the picture, and new types of barn trusses were designed. The balloon frame followed. Still newer designs are now coming in. Finally the engineer is beginning to ask, "Why all this barn anyway? Can we put this stuff in smaller volume and build less barn—less overhead?"

My illustrations are not, as you will see, to attract your attention to specific problems, but to emphasize the point that agriculture must look to the engineer for leadership in the field of physical equipment of the farm, and expect him to question the old in the light of new needs to meet an ever-changing situation.

We are looking to the engineer to teach methods, design equipment, and plan systems which make it more difficult to do things wrong on the farm, or should it be said, easier to do things right than wrong in daily operation of equipment? The safety bull pen and breeding shute is a good example of a simple, inexpensive bit of equipment which has accomplished this end. In a broader sense this problem involves a factor which might be called human efficiency, farm correlation, or engineering management. It is that thing, no matter what it is called, which brings into the complicated maze of farm tasks an orderly efficiency—everything ready for use when it is needed—everything having a place and being in its place when it is looked for—everything being done at the time most suited for that purpose—everything being done with tools adequate to the purpose, and so on. The farm shop and its equipment; the placement of tools and location of working areas; the location of implement sheds; the planning of time schedules and so on are all a part of this factor. The farm management specialists have gone a long distance with this problem in farm planning, seasonal labor loads, and so on, but they need the cooperation of the agricultural engineer in getting effectively at this intangible and all-important thing which we may call efficiency.

The place of the engineer in extension is peculiar in that his field is inclusive and brings him into cooperative relationship with practically every phase of agriculture. His extension projects are usually in cooperation with other specialists. He needs the poultry specialist in connection with poultry house building demonstrations; he needs the soils and crops men with marl excavation projects; the dairy and engineering specialists work together on barn construction, safety breeding shutes, ventilation, and so on. The home economics workers depend upon him in house planning and problems of heat, light, water, and sewage disposal. And so it is with nearly every feature of his work. In carrying forward his own program, he is constantly teaching others to carry on his projects. This I wish to assure you should not concern the agricultural engineer. His field is always so wide and so many things need his thought and leadership, that the trail ahead is full of alluring opportunities.

ENGINEERS KEEP AGRICULTURE UP-TO-DATE

May I call your attention to some examples familiar to you all which illustrate my next point. The agricultural engineer must be sensitive to changes in the times, to new needs, new inventions and such things as call for a modification of his program. Following the war there were released to the states enormous quantities of war-salvaged explosives for use in agriculture. To whom did we look for help in making that campaign effective, safe, and with long-time benefits coming out of it in an educational way? More recently a great variety of insulation materials have been put on the market. To whom are we looking for information on the proper and advantageous use of this method of building? And now through times of adversity we are learning the need for conservation of materials, the care of equipment and the rejuvenation of old farm machinery from whom—the engineer. Drought of unprecedented severity taught us that irrigation may be of value in areas other than the rainless desert. We had thought of irrigation as water moving in a ditch by gravitation, but the agricultural engineer has now shown us the water moving over the field uphill and down,

[1]An address at the College Division session of the 26th annual meeting of the American Society of Agricultural Engineers, at Ohio State University, Columbus, June 1932.

[2]Director of agricultural extension, Michigan State College.

oozing from the sides of a canvas hose, and being used by farmers to protect valuable crops against both the short and long dry spells. And so I say, it is the engineer upon whom we depend to keep agriculture in tune with the times and alive to new opportunities and ways of meeting new situations.

I would not have you think from the illustrations just used that the agricultural engineer is regarded as an opportunist in the extension program. On the other hand, those of us who have observed the work for more than two decades know that his effort must be steady and sustained and founded on the long-time plan. The engineering projects do not often lend themselves to campaign methods. Only a few farmers within a community may be ready to take advantage of an opportunity this year, a few more next year and others later. Thus the septic tank demonstations were the first to be conducted in our projects in Michigan, but in 1931 these demonstrations were still running the strongest of anything in the whole program. Thousands of these septic-tank sewage disposal systems have been built and remain as permanent demonstrations, yet other communities continue to call for similar instruction. The surveying and construction of tile drains and the building of terraces are demonstrations which have been conducted for years, and probably will be continued beyond our time. In meeting such long-time problems the extension agricultural engineer has learned the value of permanent demonstrations, and he attempts to make his demonstration a solution of that problem for that community for some time to come. He has also learned that the permanent demonstration must be correctly done in every detail, or it may become a permanent liability to him. Congratulations are due to the extension engineers, as I know them, for the high standard of perfection attained in the demonstrations conducted.

In the field of the application of electricity to agriculture, the engineer has been a pioneer, a blazer of new trails. He has been a leader in visioning its possibilities for the electrical industries and for agriculture. He has had to demonstrate his faith step by step by means of experimental lines and especially designed equipment. His job has also included the human factor of getting the producer and consumer together on a permanent and fair basis of contractual relationship on the building of lines, rates, wiring, and so on. In doing this he has had to sell himself, the institution which he represented and the program which he has had to offer to the electric power companies and to the farmers. Then, after laying this groundwork, he has had to carry on the educational program on a sustained basis, not forgetful of the fact that each new user of current is a new pupil in need of the most elementary instruction, and that each old patron of the high-line is looking to him for information on the effective and efficient way to make use of this new power.

It is the responsibility of the agricultural extension engineer to keep his program free from commercialism. The industrial concerns have and will continue to develop products which are of great value to the farmer. These companies are willing to be their own salesmen, leaving to the colleges the educational field. If manufacturing companies have been too closely a part of our demonstrations it has been our own mistake, not theirs. We need their cooperation, but it must be on a carefully thought out basis, which leaves the farmer in an unprejudiced state of mind with full information upon which to exercise his own judgment.

EXTENSION DEPENDENT UPON RESEARCH

It has been difficult in this talk to clearly separate the research field from that of extension. The relationship is of necessity closer than in many other subjects. In many cases the two activities are carried on by the same individual. The subject is introduced here to emphasize the point that the place of the agricultural engineer in extension is dependent upon an effective and sustained research program. This program must be timely, vigorous, and ready to grapple with emergencies which demand immediate results. The corn-borer control campaign was such a situation. New kinds of jobs had to be done. New machines had to be designed. Low-cutting corn harvesters and plows designed to turn under all refuse were the engineers' contribution to the emergency situation. But the effort on this problem will be sustained until we are more certain that better mechanical methods of control are not to be found. The weed-control problem is also a good example of a problem to which the agricultural engineer has given aid but to which he is sticking with persistence to give further help. In Michigan one of the weeds which gives great trouble is quack grass. Methods of control are known, yet extension and research men still are working together toward better appliances for gathering these plants, root and branch, from the soil.

Those in charge of administration will expect the agricultural engineer in the future to make a careful study of the methods used in extension work. He has met the demands made upon him in the past by methods which produced results, but without sufficient regard for the cost per person reached. Handling extensive campaigns such as war-salvage explosives, upon which time limits were set and margins paid for educational work, may have for a time obscured the necessity for economy and efficiency. The challenge is now before the engineer to simplify and cheapen his methods and at the same time achieve results. More use must be made of permanent demonstration structures already established and more simplified teaching materials must be developed.

Demonstrations involving considerable expenditure by the farmer may need to be eliminated for some time and replaced by other methods yet to be developed.

SUMMARY

1. The agricultural engineer must question everything and accept nothing as the final step toward perfection.

2. The agricultural engineer is expected to bring greater simplicity into farm equipment and to achieve orderly efficiency in its operation.

3. It is the place of the agricultural engineer to cooperate with all extension forces in the farm and home-equipment phases of their projects.

4. The agricultural extension engineer has a large place in keeping agriculture in tune with the times and in meeting emergency situations.

5. It is the responsibility of the agricultural extension engineer to develop a long-time program and to continue a sustained effort in these phases of his work.

6. We will look to the extension engineer for the maintenance of the right relationship to the commercial companies which may have an interest in his demonstrations.

7. The extension engineer must recognize that the future of the program is dependent upon research work and that it is his responsibility to bring to the research forces those problems which are met with in the field.

8. The development of demonstration methods and extension teaching methods in keeping with the whole agricultural situation is a responsibility of the engineer in which he will need to cooperate with administrative forces.

9. And, finally, throughout this whole program the agricultural engineer in extension must be an educator. His leadership must be in the direction of self-reliance, self-confidence, business judgment, and personal understanding in relationship to all farm processes and objectives. It is not enough to know and to teach the technique of machines, explosives, power, electric current, and so on. The extension engineer must know agriculture as a whole; he must know home life as the final product of the farm, and he must know people themselves; their needs, their aspirations, as well as their reactions and responses. His program must progressively lead toward a simplification of services to agriculture, toward efficiency in the physical equipment of the farm, and most of all toward the higher standards of living through improvement of those things which help to bring to farm people the fundamental satisfactions and comforts of life.

Teamwork in an Engineer's Policy for Agriculture[1]

By James T. Jardine[2]

IN ACCEPTING the invitation of your Meetings Committee to speak on the general subject, "An Engineer's Policy for Agriculture," I did so mainly because I believe an analysis of this subject is worth while, especially at this time. I have no "push button" formula to present for approval, but if I am able by suggestion to help direct systematic thought along this line, the result will have been worth while.

First, may I state frankly, as a fundamental premise, that an engineer's policy for agriculture should agree in major objectives and principles with similar policies for agriculture acceptable to other interested groups of people. Unanimity of opinion among all interested groups as to those major objectives seems essential to systematic analysis and working out effective activities to carry out the policy. The first basic element for consideration in an engineer's policy for agriculture would appear then to be teamwork with the other groups concerned, especially technical and scientific groups.

I am impressed next with the question: To what extent are we capable of solving our agricultural problems within our own frontiers? Some thought must be given to this as a logical approach to a further policy for engineers. Stuart Chase, writing on the subject "You and I and the Big Idea," says: "We have the natural resources, despite their shocking waste to date; we have the skilled engineers, the magnificent technical plant, the laboratories, the research bureaus; above all the able and vital population, to work out a national plan for a safe and prosperous journey into the future. We have another potential aid, which very few have realized: The economy of abundance, the clear potentiality of high living standards for everybody."[3]

Suppose as engineers we accept Mr. Chase's statement as a general basis for further anlaysis, but still recognizing the importance of other relationships. What further elements are basic in our policy as it affects agriculture? In this connection L. W. Wallace, executive secretary of American Engineering Council, makes the pertinent suggestion that "the battle front of the engineer of the future will be not only controlling and utilizing the forces of nature, but also combating all impediments to the advancement of the social, political, and spiritual well-being of the human race."[4]

Suppose we also accept Mr. Wallace's statement and combine its sentiment with that expressed by Mr. Chase. Thus we arrive at a general but basically sound policy for our engineering endeavors in cooperation with others about as follows:

> As engineers we recognize that the United States has natural resources, the technical staff, the technical plant, the able and vital population essential to the working out of a national plan for agriculture which will assure high living standards, and to this end as engineers we recognize a responsibility for controlling and utilizing the forces of nature advantageously, not merely for material production and distribution of agricultural products, but with the broader view of advancing the social, political, and spiritual well-being of the people engaged in agriculture.

Assuming that we accept this challenge to our sincerity as well as our ingenuity, our next step is to decide what shall be our specific objectives in applying our engineering efforts. Shall it be the universal establishment of mechanized corporation farming with a large majority of the agricultural workers employed as day wage laborers? Shall we strive for the other extreme of a maximum number of individually owned farming units which are homes as well as means of livelihood and profit, which are self-supporting as regards the necessities of life, and which are as nearly self-sufficient mechanically as is feasible through the perfection of small-unit equipment? Shall we advocate specialization and 100 per cent efficiency in the production of one crop or commodity, such as cotton, corn, or wheat, with the individual farm in the market as a purchaser of all other commodities and necessities of life, and on this basis adjust land units to the most efficient units of machinery, labor, and physical plant?

Shall we participate in the development of a land utilization policy based upon a volume of production actually needed to afford plenty for all people and a rational disposal of surpluses? Shall we advocate and participate in bringing about economic combinations of such factors as soil, climate, transportation, and organization which will permit individual crops or commodities to compete in consumer markets to the advantage of both producer and consumer?

Shall we advocate the greater diffusion of industry throughout rural America as a means of providing safeguards against food shortages for workers in industry, and perhaps some opportunity for agricultural workers to supplement their income by working for other industries? If so, what shall we do about the possibility of resulting unemployment and surpluses of agricultural products when workers in industry also engage in agricultural production? This is a real and not an imaginary problem, as there are indications of a decided movement of erstwhile industrial workers back to the farm as a result of the depression.

I raise these questions because, along with many others, they are all live questions pertinent to an engineer's policy for agriculture. My purpose is merely to get some such factors into the open as samples to indicate how complex the field is to which our policy must apply.

SOUND, BROAD OBJECTIVES ESSENTIAL

To answer any one of these questions would not get us far toward a sound conclusion as to a well-rounded, workable objective for agriculture as a whole. To answer all such questions and arrive at well-rounded workable objectives is beyond our present consideration. The fact remains, however, that the working out of broad, sound objectives is an essential element of the agricultural problem, and engineers are vitally concerned. They are already blamed by some for disturbing the equilibrium by mechanization, and they will continue to play an important part in the rational or irrational development ahead. And finally, engineers, serving all industries as they do, have special opportunity to assist in working out objectives for agriculture, including essential relationships to other industries—objectives which will give direction to efforts for specific application of engineering to agriculture. Without such orientation or direction, efforts may produce only "static."

Meantime for the purpose of our present consideration we must assume objectives as a basis for development of an engineer's policy in specific application of engineering to agriculture. In this regard we may safely conclude that objectives should be flexible enough to permit of prac-

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[1]An address before the 26th annual meeting of the American Society of Agricultural Engineers at Ohio State University, Columbus, June 1932.

[2]Chief, Office of Experiment Stations, U. S. Department of Agriculture.

[3]Chase, Stuart. Graphic Survey, 67 (1932), No. 11, pp. 566-568.

[4]Wallace, L. W., Engineering Educational Standards. Agr. Engin., 12 (1931), No. 9, pp. 343-345.

tical adjustment to forces not yet under control and should have in mind as an end product, always, the economic, social, and spiritual welfare of people—people locally, regionally, and nationally.

Viewing the situation as a whole—the immense diverse territory involved in agriculture, the millions of people and consequently the great human and political factors to be dealt with, the transportation and distribution factors, and the relationships to other industries—one must conclude that any major changes will be gradual. The family farm may be enlarged in area as an adjustment to modern methods, but replacement of such farms by corporation farming will be slow. Specialized farming may replace diversified farming in some localities, but in turn will be replaced by diversified farming in others. Agriculture will continue to adjust itself to lands advantageous in quality and location, but what is called the marginal land problem will not be eliminated at once for the perfectly good reason that time will be required to work out an adjustment which will provide other means of livelihood and security for those who vacate such lands.

In other words, the engineer may conclude that his field for application of engineering to agriculture will continue to include the present types of farms and farming with varying need and emphasis, depending upon further scientific developments, changing agricultural geography, economic conditions, location, and, to some extent, state and national planning. As a policy he should keep the whole field in mind, but with particular attention to the possibilities for the family-farm unit, until more specific objectives have been arrived at on the basis of economic and social factors as well as the purely engineering factors.

AGRICULTURAL ENGINEERING OPPORTUNITIES

On this basis what are the more specific opportunities for application of engineering to agriculture? My thought in this connection is summed up in an editorial published in "Nature" (London), issue of December 26, 1931, which says in part: "Present-day engineering achievement, patent to the public on every side, the outcome of considered thought and exact work, is sufficient evidence not merely of what is but of what might be, if we combined our forces to useful public ends." The "we" refers not merely to engineers but to others as well. In such combination of our forces, engineering has real opportunities in the application of knowledge and in research to acquire new knowledge.

Let us examine briefly the fields of farm implements and farm buildings. As an approach to this subject, however, we must first dispose of the question of whether a sound policy demands continued efforts for increasing efficiency of manpower and individual acres in production and distribution and marketing of agricultural products. Perhaps the best way to arrive at a decision is to consider whether our agricultural population as a whole would give up labor-saving equipment, mechanical power, better livestock, improved crops, modern efforts and methods of controlling diseases and pests, and other advancements which have contributed to the vast increase in efficiency of an hour's labor. The efforts of our agricultural people have been quite to the contrary from colonial times to the present. With the aid of science they have conquered deserts, subdued pests, and developed the first essential of a nation—plentiful production of food and raw materials, even to luxuries. At the same time they have liberated themselves from much of the old-time long hours of drudgery in the field and in the home. Ask them now to turn into a different road and cease their individual, community, state, and national efforts in the matter of efficiency, and the answer would probably be No! Give us more efficient machines and methods. Find another way of adjusting difficulties. Suppose the agricultural people answered differently. What position would the 75 per cent of our population take who are purchasers rather than producers of agricultural products? Also what would be our position in disposing of surpluses in competition with products grown elsewhere?

Considering all angles a sound policy would seem to be one of a living and reasonable profit for the producer and low prices for the consumer. This means continued efforts for greater economy of producing and distributing high quality products as a first line objective.

In line with this, what of agricultural machinery and implements? Notwithstanding the invention of labor-saving and cost-saving implements, such as the plow, the reaper, the combine, and the tractor, there are uncharted possibilities for improvement and use of implements to better serve the purpose of economy in cost, in power requirements, in labor, in soil maintenance, in crop injury, and to improve yield and quality of products. Likewise there are opportunities and there will be need for development of new equipment to further apply scientific knowledge to present and new problems of production, protection from diseases and pests, harvesting, storage, manufacturing, transportation, and utilization of agricultural products. A few examples will give meaning to this broad statement.

The proper and economical adaptation of available tillage machinery to the production of the tilth conditions desired for row crops in farm soils has offered a difficult problem, especially in southern agriculture. Studies by the departments of agronomy and agricultural engineering at one of the agricultural experiment stations of the South have resulted in the expression and evaluation of the mechanical reactions in soils, under the influence of tillage implements, in terms of their physical and physico-chemical constants. It has been possible to control and manipulate these reactions by engineering procedure in a manner permitting the more or less specific adaptation of different available plow shapes to the requirements of the important soil types. This is resulting in a maximum of efficiency and of economy in labor and power in producing the tilth conditions required by different crops, especially in the more difficult soils.

Corn planting and fertilization have offered a set of problems involving improper placement of both seed and fertilizer, fertilizer injury to the plants, fertilizer waste, and excessive expenditures of labor. Studies of these problems by the departments of agronomy and agricultural engineering at one of the agricultural experiment stations in the Corn Belt resulted in the development of methods and the mechanical principles of equipment which permit the planting and fertilization of corn in one operation with one machine. The seed is properly spaced at the proper uniform depth, and the fertilizer placed where it will be of maximum benefit and of minimum injury to the growing plants. Thus the agronomic requirements for planting and fertilizing corn are met with engineering precision and the labor requirements and the cost of the necessary machinery reduced to a minimum.

CROP DEHYDRATION

Johnson grass hay is one of the more important hay crops in dairy farming in some of the southern states. Yet the losses through spoilage and impaired quality by ordinary methods of natural curing have been excessive due to the relatively long time required in curing under normal weather conditions and to the frequent intervention of inclement weather. Studies of this problem by the departments of plant physiology, agricultural engineering, and animal nutrition at one of the state experiment stations resulted in the reorganization and manipulation of the mechanical processes and the improvement of the equipment for hay harvesting which promise to complete the natural curing of Johnson grass hay in eight hours, or within the limits of one working day. The improved procedure appears sound and practical from the standpoint of the physiological reactions and requirements of the hay plant and of the mechanical principles of the machinery involved. The time and labor required in curing are reduced by from one-third to one-half, the losses through spoilage are reduced to a minimum, and hay of optimum nutritive quality and digestibility is produced.

The lack of satisfactory power-operated field machinery for use on sugar-cane plantations, particularly tillage and

cultivating machinery adapted to the ditched and bedded conditions of cane growing under the levee, is a problem in cane production. For example, cultivation by previous available methods resulted in root cutting and serious injury to the cane. Studies by the departments of agronomy and agricultural engineering at one of the state experiment stations has resulted in the development of cultivating methods and the mechanical principles of equipment which, when properly adapted, should meet the agronomic requirements for cane cultivation and reduce root cutting to a minimum. At the same time the procedure involved represents sound and economical engineering practice.

Available methods and equipment for planting cotton were not adapted to the terraced sloping soils of some of the Cotton Belt states since the rigidity and weight of the machinery used caused either too deep or too shallow planting in cross-terrace rows and improper placement and coverage. Cooperative studies of this problem by the departments of agronomy and agricultural engineering at the experiment station in one of the cotton states have resulted in the development and adaptation of planting methods and equipment which involve sound features of flexibility and adjustability in the planting mechanism and meet the agronomic requirements for proper placement, degree and uniformity of planting depth, and proper coverage and packing on sloping soils with cross-terrace rows.

The principal justification for farm structures, other than homes, is economical production

These examples illustrate the fact that the proper development and use of mechanical equipment for crop production necessitate full consideration of the agronomic requirements and conditions as well as the use of fundamentally sound engineering procedure.

So much for cotton, corn, and hay. How about the people? Let us not forget, both in policy and in plans for carrying it out, that the welfare of people in a broader sense than dollars should be kept in mind. Interest, satisfaction, and pride on the part of the operator in the way an operation is performed and in the completed job have their bearing on welfare. Improvement in an implement or in its application to the end that a job may be accomplished with greater satisfaction and pride by the operator is worth while. If accompanied by reduction in production cost, or in production of a better quality product, the benefit is multiplied. Further, the few examples given deal with field equipment. The engineer should not cease his efforts to perfect and adapt equipment for the many tasks about the shop, the barn, and the store house. Measured in terms of satisfaction and social welfare, accomplishments toward converting chores into recreation may mean as much toward satisfaction and social welfare as to improve an important field machine.

The suggestion of opportunity for further productive service in this field is an indication of the great service that manufacturers of farm implements are rendering. The growing use of machinery for new and ever newer tasks, together with refinement of agricultural practices based upon scientific findings, calls for adjustments of the equipment to the factor requirements of the particular job. The factors to be met by machine operation will probably be developed in large part by the agronomist, soils specialist, animal husbandman, horticulturist, pathologist, entomologist, home economist, the butter manufacturing expert, or other specialists individually or jointly. The engineer will be called upon by all to adapt implements to the job, and the jobs are going to be more numerous, more specific, and more exacting.

What of engineers in relation to farm housing? The 1930 census places the value of buildings on farms of the United States at $12,949,993,774, representing about 37 per cent as much as the land value. Of this total, dwellings represent about seven billion dollars and other buildings on farms about six billions. Consider this investment distributed over the 6,288,648 farms in 1930 with the variation in climate and uses which must be met, and we have a glimpse of the farm housing field for consideration in an engineer's policy for agriculture.

To quote the President's Conference on Home Building and Home Ownership; "The house on the farm and in the village is the central structure of family life, and as such it affords a conditioning atmosphere for happy or unhappy relations among the members of the family and for the natural expressions of childhood activities."[5] The same conference accepts Gries and Taylor's statement that "the essentials of housing which general standards of health and decency would support include shelter from the elements, light, ventilation, water supply, disposal of waste, privacy, space for play and family gatherings, arrangement and equipment affecting the amount of labor required for housework, appearance and general attractiveness, housekeeping maintenance, and constant improvement as the family's needs develop and its taste improves."[6] Economy in construction, equipment, and maintenance to accomplish these essentials are imperative to progress. Is this a field solely for the sociologist, the home economist, and others? Certainly there is opportunity for the engineer in the matter of materials, design, construction, heat, light, ventilation, water supply, disposal of waste and equipment. Again it is a challenge to interest and effort beyond the mechanization and organization of agriculture. The welfare, satisfaction, happiness, and efficiency of people are in no small degree influenced by the home and home surroundings. Engineers especially through interest and active cooperation with other groups can aid much in furthering progress toward national ideals of suitable housing for all our people. As a policy in this regard, the engineer's best work may be not so much a matter of action by organization as through interest and activity on the part of each in furthering the general project and through helpfulness in his own locality. His objective should be nothing short of national ideals.

The saying that nothing is constant but change applies rather well to the question of farm structures other than dwellings. The individual farm, to a greater or less degree, is a modern manufacturing plant. As I was writing this paper, a bulletin on equipment for swine production, issued by the Kansas Agricultural Experiment Station in cooperation with the Engineering Experiment Station, came to my desk. On first thought the layman might well ask why, after centuries of swine production, is there need for research and a new bulletin on the subject. The problem of farm structures in present-day and future agriculture differs much from that of our forefathers. Then the hous-

[5]President's Conference on Home Building and Home Ownership. Tentative report of Committee on Farm and Village Housing, 1931, page 9.

[6]Gries, John M., and Taylor, James S. "Housing Standards," in The Better Homes Manual. Edited by Blanche Halbert. University of Chicago Press. 1931. Page 511.

ing of animals and farm products was considered essentially one of shelter from inclement weather. But today, without minimizing the element of shelter, the problem of such structures involves location, design, materials, construction, and equipment which will apply effectively the accumulated findings of science on the relationship of housing, equipment, and management to low-cost production and marketing of high-quality products. The bulletin on equipment for swine production, for example, discusses the location fo the swine house as to drainage, desirable sun exposure, windbreaks, accessibility to pasture and shade, maximum protection from disease infection, economy of labor, and time in management. Research facts and results in practice point to the importance of attention to each such item for efficiency in production. In the matter of design and construction the items of warmth, ventilation, sunlight, dryness, sanitation, safety and comfort, convenience, sufficient size, durability, reasonably low first cost in keeping with service rendered, and equipment, each is emphasized because of its bearing upon economical production of pork, which is the essential reason for having both the hogs and the structures.

This illustration in connection with swine production is less complex perhaps than housing and equipment essentials for the efficient operation of the dairy or the poultry farm, where so much of success depends upon quality of milk and eggs when they reach the market. And so with most farm structures today, whether they are for livestock or for processing and storage of products, the need is not merely for shelter in the older sense of the word, but shelter combined with creation and control of environment and management consistent with production, preservation, and marketing on an economical basis.

FARM BUILDING INVESTMENT

But why so much space to this item in an engineer's policy for agriculture? The answer is found (1) in the fact that such housing, aside from dwellings, represents about one-eighth of the total investment in land and buildings on farms for the United States; (2) the problems of design and construction are becoming more important and more complex with advancement in modern methods of scientific and mechanized agricultural production and marketing; (3) this field has not been given the attention that is warranted by the necessary large investment, the opportunity for economy in construction and maintenance, and the bearing of the whole on economy of production; (4) there is obvious need of the engineer working in cooperation with the production specialists in the research and planning fundamental to economy in construction, maintenance, and operation of this essential, continuing investment. Aside from the important relationship of structures to the net returns from crops, animals, equipment, and labor, the opportunity for improvement is apparent from two citations at hand on losses due to wind and fire.

Marvin F. Schweers, reporting on studies of farm building losses due to wind, says in substance that of the total of nearly $220,000 paid by the Iowa Mutual Tornado Insurance Association in 1930 over 60 per cent was for buildings demolished, straightening and bracing buildings, returning buildings to their foundations, restoring roofs, replacement of glass and screens and repair of machinery damaged by falling timbers, which in many cases were due to poor design or faulty construction.[7]

According to the U. S. Department of Agriculture, "the annual farm fire loss is more than $100,000,000, and to this economic loss must be added a yearly loss of 3,500 lives. Fire losses are truly economic losses and in the majority of cases are preventable."[8]

Economy of the agricultural physical plant in arrangement, materials, construction, maintenance, operation, and quality of products turned out has much to do with success of agriculture. Engineers should participate actively to this end.

[7]Schweers, Marvin F., Farm Building Losses in Iowa Due to Wind. Agr. Engin., 13 (1932), No. 5, pp. 117-119.

[8]Geise, Henry, Research in Farm Structures. U. S. Department of Agriculture, Miscellaneous Publication No. 133, April, 1932.

There must be conscious effort on the part of specialists and groups of specialists, bordering upon enthusiasm for such coordination of effort as may be necessary for orderly, scientific attack and solution of problems in their entirety

Through specific application of engineering in these fields of power, equipment, and housing, the engineer will perhaps make his more tangible or measurable contributions to agriculture. In the future as in the past the tendency will be to appraise such contributions in terms of material benefits from the individual accomplishment—perhaps more work, in less time at less cost and with convenience to the operator. As for the past, as one raised on a farm, I have appreciated and welcomed these benefits. The charge that some would make against mechanization in agriculture is more than answered for one by the release of so large a portion of our population from the drudgery which was theirs before human power was so largely replaced by mechanical power and all the labor-saving devices and conveniences which go with the change.

But looking to the future it seems to me that we have a somewhat different situation. Until comparatively recent times, as an average, there has been little occasion for concern over increased total production. Therefore, if an enginering application worked well in the individual case why reason through to estimate the possible upset economically and socially from the application of such engineering contribution throughout our agriculture, or the agriculture of the world. Now, however, we are confronted with a problem, or set of problems, which appear to call for the best efforts of all in keeping total production in line with practical consumption demands. Under this new situation the engineer might well ask himself whether he has taken full account of the social and economic adjustments which may be imperative as a result of his new engineering application to agriculture. Has he really formulated a logical relationship of his perfect machine or machines, and his control of natural forces, to welfare and happiness of the people in agriculture beyond the assumption that more dollars, more conveniences and less labor should result in the individual case? If so, has he been active in promoting a better general understanding of this relationship and active in promoting logical adjustments so as not to upset other efforts in lining up production, distribution and consumption? Such adjustments may be in the field of distribution or in consumption. If ways are found to place products within practical reach of all people consumption can no doubt be increased to the benefit of our people as a whole.

BASIC POINTS IN A POLICY FOR AGRICULTURE

Increasing efficiency to the end of lower cost of production of high-quality products should continue as a first line action toward the objective of a living and fair profit to the producer with ample supply and reasonable cost to the consumer. But along with efficiency in this regard there should be comparable efficiency in regulating total production to reasonably ample supply and in the distribution of such supply if the best interests of both producers and consumers are to be served. Proposals for accomplishing this end are not lacking. It is not the purpose of this paper to discuss them, however, further than necessary to indicate a possible relationship of engineers to the whole problem and to offer suggestions as to an engineer's policy. Perhaps we have gone far enough to warrant assuming the following as basic points:

1. That a practical policy for agriculture must not ignore the welfare of the 75 per cent (approximately) of our people who are consumers and not producers of agricultural products.

2. That a sound continuing solution of our agricultural difficulties, therefore, is far broader than merely

adjusting production. Economic, social, and political factors, including marketing, distributing, financing, and consumption, are involved and will need to be coordinated to the end that welfare of the great masses of people will be best served.

3. That the problems of adjustment are largely national as regards coordinated planning, whereas they are regional or local as regards specific application.

If these observations are fundamentally sound we may further assume that no one group, whether engineers, economists, sociologists, financiers, industrialists, politicians, or philosophers, alone have been delegated the divine right or responsibilty of a solution. A coordinated undertaking stimulated and supported by an awakened public interest and understanding is needed—needed in bulk great enough to more than offset the natural factors of group and local special interest.

The engineer's policy might well include participation in the development of such a background of public interest and understanding and even leadership as opportunity affords in the coordinated planning. The engineering profession ordinarily is credited with orderly thinking and planning followed by action, and, as stated, engineers are blamed by many for a large measure of the present maladjustment. They would seem therefore to have both a responsibility and a right for active participation to the end that people will be the masters rather than the slaves of the machine age.

Teamwork, through cooperation with other groups, was stated as a first principle in an engineer's policy for agriculture. In closing I wish to comment further on this point.

Conscious and active application of science to the problems of agriculture for our purposes may be said to have begun in the field of chemistry little more than a century ago. From this beginning the swing was to a professor of agriculture who was supposed to cover the whole field. Today we have, through necessity and modern tendency, divisions and subdivisions to the extent of intensive specialization in the service of science to agriculture. The relationships and interrelationships are not always clearly apparent. Such specialization can not avoid the danger of one-sided attack and one-sided conclusions, unless the individual workers and the leaders of subdivisions and divisions keep constantly in mind (1) that present intensive specialization is due largely to inability of one individual or group to function technically with efficiency for the whole field, and (2) that responsibility lies with the individual and those in charge of subdivisions and divisions for maintaining a proper working relationship with other specialists and groups. Organization alone can not accomplish the best end. There must be conscious effort on the part of specialists and groups of specialists—effort, I might say, bordering upon enthusiasm for such coordination of effort as may be necessary for orderly, scientific attack and solution of problems in their entirety.

From my own experience, over the past twelve years especially, I am impressed with the spirit of cooperation of the agricultural engineers in their relationship with other specialists engaged in the study of agricultural problems. As a future policy I hope that you as engineers, individually and as an organization, will go even further than what might reasonably be expected of you and actively promote effective, coordinated application of science and scientific method to the end that there will be not only policy and direction in progress but coordination of the physical, biological, economic, and social forces at work in the interests of agriculture.

Operation of Sunlight Lamps in Series

By Harry Miller[1]

INVESTIGATION of the use of short-wave radiation in agriculture has been stimulated recently by the development of small mercury-arc lamps and lighting equipment suited to household and production applications. During investigational work it has been desirable to use several of the sunlight lamps as a source of light energy. A set-up of this kind was desired by the department of agricultural engineering at the University of Idaho. To avoid the expense of the regular transformers, three lamps were used in series with an external resistance.

The lamp referred to is a combination filament and mercury-arc type known to the trade as the S-1 sunlight lamp. When the current is applied, it starts to burn as a filament lamp until the heat vaporizes some of the mercury in the bulb, causing an arc to strike between the electrodes and the lamp to operate as a mercury vapor arc.

According to the volt-ampere curve for the S-1 lamp[2], the resistance of the filament is 3 ohms and draws 9 amperes at the point where the arc strikes. When the arc begins to operate, the resistance of the lamp drops immediately, stabilizes at about 0.32 ohms, and draws about 30 amperes.

Under operating conditions three lamps in series on 110 volts should have a total resistance of (110 ÷ 30), or 3.66 ohms, or an external resistance of 2.70 ohms. Under starting conditions, with each lamp having a resistance of 3 ohms, three lamps in series have a total resistance of 11.7 ohms, which would allow 9.4 amperes current flow. The arc will strike in lamps thus connected with 9 amperes flowing, so the same external resistance will work for starting and operating. This method has been tried successfully and the lamps operated for an intermittent period of 400 hours.

The radiation from these lamps operating in series and on the transformer was compared by means of a photoelectric cell and galvanometer. The cell was placed 17½ inches from the lamp and a potential of 90 volts applied to the plate. The lamp was in both cases allowed to come up to constant temperature. The reading without a filter in series was 188 microamperes, as compared with 148 microamperes on the regular transformer. Through a "corex A red-purple" filter (this filter is transparent to ultra-violet and a small amount of visible violet only) the reading in series was 155 microamperes on the series circuit, as compared with 117 microamperes on the regular transformer. These results show that more radiation in the ultra violet region was emitted in the series set-up than with the regular transformer. There appeared to be no objection from the standpoint of service life of the lamps when used in this way. Of the lamps operating in series, the first failure occurred after 400 hours of service. One of the lamps was blackened to the extent of seriously affecting its efficiency, while the remaining lamp had considerable useful life. These results compare favorably with the operating characteristics and service life of lamps operated on the regular transformer.

An effort was made to operate the lamps at lower amperages, but this resulted in the lamps operating at lower temperatures, causing mercury to condense on the interior walls of the bulb, and lowering the efficiency of the lamps. The leads to and from the lamps should be twisted together to eliminate as far as possible any induction that might occur.

Operation of S-1 lamps by this method is satisfactory where profitable use can be made of the energy dissipated in the external resistance, or in experimental work where the purchase of the regular transformer equipment is inadvisable.

[1]Department of agricultural engineering, University of Idaho. Assoc. Mem. A.S.A.E.

[2]"General Electric Review" June 1930.

Efficiency of Terracing Machines[1]

By J. C. Wooley[2]

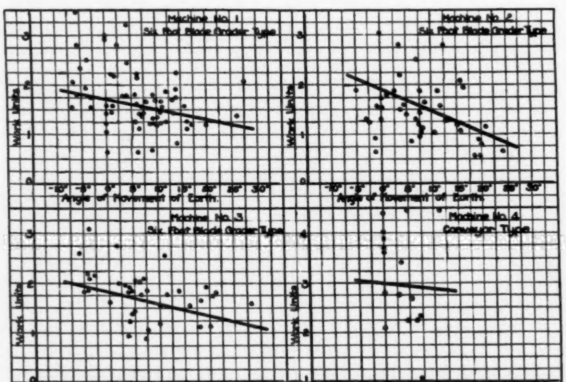
WIDESPREAD adoption of the practice of terracing farm lands indicates that the practice is here to stay. The interest of the farmer has changed from the question of the success or failure of the practice to methods and equipment for construction. Farmers report that it is necessary for them to drive from ten to thirty-five rounds to secure a terrace of sufficient size to meet their needs. This statement does not mean much on account of the variation in standards as to sizes of terraces, as well as other influencing factors, but it indicates a wide variation in the work being done in the construction of terraces. It probably will never be possible to standardize on terrace sizes and shapes for all parts of the country, but standardization of the method of describing the terrace would be possible and desirable. The amount of work required to build terraces, and consequently their cost, can be placed on a working basis only by describing the variable factors that influence the amount of work and the cost. These would be the soil type, the state of erosion in the field, the availability of outlets, the machinery available, the experience of the man, and the power to be used.

The machine is one of the important factors and has much to do with the success or failure of any terracing project. From a study of practical terrace sizes, it seems to be necessary to move from 18 to 36 cu yd of earth per 100 ft of terrace to secure a satisfactory size over which to farm. It may be seen, therefore, that the protection of cultivated land by terracing will require an enormous amount of power and labor for its accomplishment.

In the year of 1930-31, Mr. D. E. Springer, a graduate student in agricultural engineering at the University of Missouri, conducted tests on a number of terracing machines. This work is being continued by Mr. O. E. Hughes at the present time. The plan calls for the measurement of the draft of the machine, the amount of dirt moved, the distance it was moved, and the vertical change accomplished in the process. To measure the draft a dynamometer of the compression-spring type was built into the tractor hitch and was read direct by the tractor driver.

[1]Journal Series Paper No. 330, Missouri Agricultural Experiment Station, department of agricultural engineering. Released for first publication in AGRICULTURAL ENGINEERING.

[2]Professor of agricultural engineering, University of Missouri, Mem. A.S.A.E.



These curves show the relation of terracer output in work units to degree of completion of terrace as indicated by angle of movement of earth, for the four machines tested

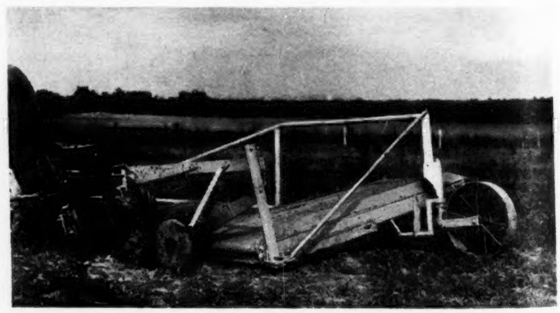
In order to secure data on the movement of earth, from three to five stations were set up along the course of the terrace. At each two stakes were driven, one on either side of the terrace, about 20 ft from the center line. A tape was stretched level and tight between the tops of these stakes and readings of distance to the ground taken at 6-in intervals. A profile was then plotted. After each time through with the terracing machine the fill was tamped, another set of readings taken and a profile made. The difference between these profiles showed the cut and the fill. Area of cut was used in computing the amount of dirt moved. The profiles before and after each cut enabled us to find the volume of the settled dirt moved, the distance it was moved, and the angle of movement. Distance was measured from the center of the cut to the center of the fill; the difference in elevation between these centers was taken as the amount of lift accomplished, and the angle of movement calculated from these data.

It was necessary to establish a work unit by which machines might be compared. One cubic foot of earth, moved one foot laterally for each foot of forward motion, was taken as the work unit. The number of work units accomplished in unit time, would, of course, depend upon the angle through which the dirt was moved. If it were being lifted onto the terrace ridge, then the work units would be reduced. If it were being pushed down grade as in the first cut, then the work units would be increased. The slope of the land has an effect on the amount of lifting that needs to be done in constructing the terrace, but is not otherwise considered in the results.

In order to show the number of work units accomplished at different points in the construction of a terrace, the results were plotted with work units on the vertical scale and the angle of movement on the horizontal scale. Fig. 1 shows the results for the four different machines tested. Three of these machines were of the blade-grader type and one of the conveyor type. From the curves it can be seen that the rating decreases as the angle of lift increases.

From the final profile of the terrace the number of work units per foot of length was figured. This, divided by the number of cuts with the machine, gives the average rating of the machine in work units per foot of travel for the whole process of construction. These ratings were: Machine No. 1, 2.06; No. 2, 1.67; No. 3, 1.83, and No. 4 (the conveyor type), 2.2.

A terrace, the section of which was measured by a survey before starting and after completion, was built in nine rounds using an 8-ft blade grader. This terrace was made by moving 4.9 cu ft of earth from the upper side and 1.2 cu ft from the lower side. That on the upper side was



This conveyor-terracer was developed by the agricultural engineering department of the University of Missouri, and attaches to any two-bottom tractor plow

moved 9.8 ft and from the lower side, 7.5 ft, making in all 57 work units per foot of length. Dividing 57 by 18 gives this 8-ft machine a rating of 3.17 on this terrace.

A second terrace was constructed moving all the earth from the upper side. Practically the same cross-section was secured in each case. In the construction of this terrace 6.36 cu ft of dirt were moved a distance of 11 ft, making 69.96 work units per foot of length. Eight rounds were made, giving the machine a rating of 4.37 work units per foot of travel.

Many improvements have been made in terracing machines during the past year. Most of the improvements have been in the shape of the blade and in the strengthening of parts. The improved grader blades are designed to secure a rolling action of the earth rather than a sliding action as used on the older type of of graders. Much of the work of terracing comes in the handling of loose earth commonly found in cultivated fields rather than in the packed surface of a roadway. The increasing use of tractor power made it necessary to strengthen machines accordingly. Terracing machinery that will do the work efficiently will result in bigger and broader terraces, which will in turn decrease the necessity for redesign of tillage and harvesting machinery which must be used over them. In addition, these broad terraces will result in much more enthusiasm among farmers for terracing.

A Simple System for Testing Ground Feeds[1]

By E. A. Silver[2]

THE MODULI SYSTEM for determining the fineness of ground feeds has been in use for some time. It was devised by the University of Wisconsin and later approved by the American Society of Agricultural Engineers. This system, although somewhat intricate, is well adapted to scientific work such as the testing of feed mills. Complications arise, however, when the livestock feeder or farmer attempts to use it.

The system requires expensive equipment, and each test consumes considerable time. The material to be tested must be dried to constant weight and weighed on scales reading in grams. The necessary mathematical calculation is not welcomed by the farmer or livestock man. The most serious objection, however, from the livestock feeder's point of view, is that the result obtained by this system does not give any indication of the relative sizes of particles in the ground feed.

There is unquestionably a great need for a system which the farmer or livestock feeder can apply to determine the fineness of ground feeds. To be practical it should be simple and a test for fineness should require little effort and expense. It should show to some degree at least the proportions of different sized particles in the ground feed, with particular reference to the finely pulverized material. It is generally agreed among animal husbandry men that fine grinding is not to be recommended for most livestock. Finely ground material is poorly digested. A vast amount of power is wasted on fine grinding.

A system devised to meet these requirements may be called the "ratio system." The size of the sample selected for test is 10 oz for grains and 5 oz for roughage. Two screens are used, with a container beneath to catch the fine material which passes through the second screen. For grains the 14-mesh and the 48-mesh screens have been selected, while for roughage the 4 and 14-mesh screens give the best results. A set of ounce scales is required to weigh the material.

A 10-oz sample is placed in the top screen and shaken for approximately 2 min. The amount of material held on each screen and in the pan is then weighed separately. For example, we find 3.4 oz on the top or 14-mesh screen; 4.6 oz on the second or 48-mesh screen and 2.0 oz in the pan beneath. This sample would have a fineness of 3:5:2. The mesh of the fine screen has been selected so that it will allow the undesirably fine material to pass through. In other words, what passes through the 48-mesh screen is not desirable from the feeding or nutrition standpoint. Therefore, for a high quality of ground feed, the last figure in the ratio should be as close to zero as possible. Probably never will any feeds be required to be ground any finer than 0:10:0 fineness.

From the examples in Table I it is plainly evident that the ratio system is much the simpler of the two. It requires few calculations and practically no expensive equipment. Furthermore, it indicates, to some degree, the relative size of particles in the ground feed, particularly the finely pulverized material which is so undesirable.

Table II gives results of fineness tests made by both systems on shelled corn, wheat, and oats.

Note in particular the last test on each grain. In every case the moduli of fineness was practically the same (shelled corn, 2.43; wheat, 2.42; oats, 2.45). Yet, according to the ratio system, the fineness is as follows: Shelled corn, 1:7:2; wheat, 1:7:2; oats, 2:5:3. By the ratio system the oats differ somewhat from the other grains. This indicates that shelled corn and wheat, being of about the same nature, grind very much alike. The oats, having a higher fiber content, contain a larger percentage of coarse material, a smaller amount of medium material and a larger percentage of very fine material.

Table III shows what effect the moisture content of

Table I. Comparison of Moduli and Ratio System

Moduli System	Grain	Roughage
Weight of sample	250 gm	100 gm
Time of shaking	5 min	5 min
Method of shaking	Rotap	Rotap
Screens used	3/8, 4, 8, 14, 28, 48, 100, pan	

Ratio System	Grain	Roughage
Weight of sample	10 oz	5 oz
Time of shaking	2 min	2 min
Method of shaking	hand	hand
Screens used	14, 48, pan	4, 14, pan

CALCULATIONS (Example)

	Screens	Weights (grams)	Per cent	Moduli
(7)	3/8			
(6)	4	2.0	.8	4.8
(5)	8	4.0	1.6	8.0
(4)	14	40.0	16.0	64.0
(3)	28	120.0	48.0	144.0
(2)	48	48.0	19.2	38.4
(1)	100	25.0	10.0	10.0
(0)	Pan	11.0	4.4	
Total		250.0	100.0	269.2

$$\text{Modulus} = \frac{269.2}{100} = 2.69$$

CALCULATIONS (Example)

Screen	Weights (ounces)
14	6.0
48	2.1
Pan	1.9
Total	10.0

Fineness = 6: 2: 2

Double weights for roughage

[1]A paper presented at the Power and Machinery Division session of the 26th annual meeting of the American Society of Agricultural Engineers at Ohio State University, Columbus, June 1932.

[2]Research agricultural engineer, Ohio State University. Mem. A.S.A.E.

Table II. Results of Tests Made by Moduli and Ratio Systems

Grains	Moduli System	Ratio System	Grade Number	Remarks
Shelled corn	3.00	4:5:1	3	Medium grinding
Shelled corn	3.38	5:4:1	2	Coarse grinding
Shelled corn	4.08	8:2:0	1	Very coarse grinding
Shelled corn	2.43	1:7:2	4	Fine grinding
Wheat	3.04	4:5:1	3	Medium grinding
Wheat	3.14	5:4:1	2	Coarse grinding
Wheat	2.50	1:8:2	4	Fine grinding
Wheat	2.42	1:7:2	4	Fine grinding
Oats	3.54	6:2:2	1	Very coarse grinding
Oats	3.48	6:2:2	1	Very course grinding
Oats	2.45	2:5:3	4	Fine grinding

(Moisture Content of Grain—10 per cent)

the materials has on the results obtained from both systems. Samples containing 12 to 13 per cent moisture were tested, then dried to constant weight, and again tested. Practically no difference in the fineness results is shown for the ratio system, but a slight variation appears with the moduli system.

Shaking the sample for 2 min was of ample duration to get consistent results. Machine shaking for a period of 5 min did not change the fineness results. The only instance where the ratio might change by a longer period of shaking would be if the weight on the top screen was, for example, 6.6 and on the second screen, 3.4. This would be a 7:3 ratio. If a little more shaking was done, the weights would change to a 6.4 and 3.6, which would then be classed as a 6:4 ratio. For hand shaking, the ordinary farm riddles of 18-in diameter were used. For machine shaking, the rotap was used, with the sieves recommended for the moduli system.

In order to make the ratio system practical, a key or index must be used with it. For animal husbandry men to recommend a certain ratio, or a range of ratios, would be impractical. Therefore, to make this possible the terms coarse, medium, etc., have been discarded and grade numbers substituted. They are: Grade No. 1, very coarse grinding; Grade No 2, coarse grinding; Grade No. 3, medium grinding; Grade No. 4, fine grinding.

In order to express the ratio of fineness in terms of grade numbers, a chart (Fig. 1) has been designed which can be made in quantity in the form of a brass plate and attached to feed mills before they leave the factory.

To illustrate its application, suppose that animal husbandry men find by feeding experiments that corn ground to a 6:3:1 fineness for beef cattle gives best results. They, therefore, recommend that this grain be ground to the above fineness, or in terms of the index—Grade No. 2. The livestock feeder having this information adjusts his mill to what he thinks will produce a fineness of Grade No. 2. He then makes a test which happens to figure out as a 7:2:1 ratio. He now refers to the brass plate; counts 7 to the right, and up 2, which places the fineness in Grade No. 1. He then adjusts the mill to grind finer and

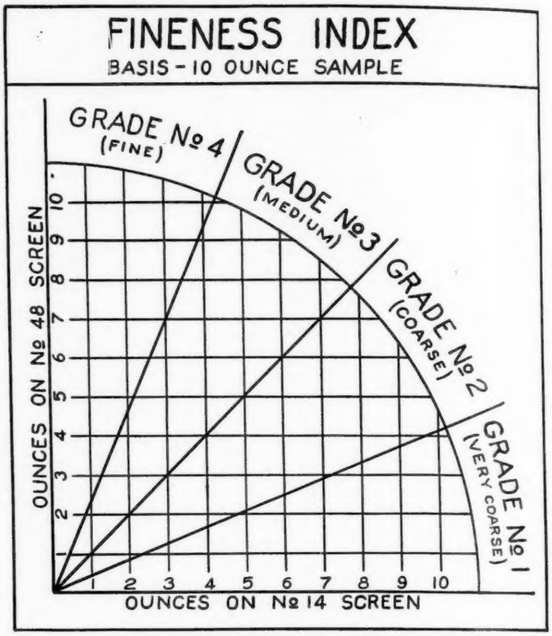


Chart for translating fineness ratios into their corresponding grade numbers

makes another test. This time the result is a 5:4:1, which, by referring to the index, is the recommended Grade No. 2.

When converting the fineness over into grade numbers, no attention is paid to the last figure of the ratio because it represents an undesirable degree of fineness. A large part of this material is left in the feed trough by the animal. For high-quality grinding the last figure in the ratio should be zero or very close to it.

It must be borne in mind that this system does not fit the requirements for scientific work in connection with the testing of feed mills. It is a simple means to enable animal husbandry men and livestock feeders to determine the fineness with which to grind feeds so that the animal may produce greatest gains from the feed it consumes. It also indicates the quality of grinding.

Table III. Moisture Content as It Affects Both Systems

Grain	Moisture content	Moduli	Ratio
Shelled corn	12 per cent	2.50	1:8:2
	Constant weight	2.50	1:8:2
Wheat	12 per cent	2.54	1:8:2
	Constant weight	2.52	1:8:1
Oats	13 per cent	2.49	2:5:3
	Constant weight	2.46	2:5.3*

*This test was just bordering on a 2:6:2 fineness

Table IV. Time Required to Shake Sample

(10-oz sample)

Grain	Methods of shaking	Screens 14-mesh	48-mesh	Pan	Ratio
Wheat	Hand (2-min)	0.5	7.5	2.0	1:8:2
	Rotap (2-min)	0.6	7.7	1.7	1:8:2
	Rotap (5-min)	0.5	7.7	1.8	1:8:2
Shelled corn	Hand (2-min)	0.6	7.9	1.6	1:8:2
	Rotap (2-min)	0.6	7.8	1.6	1:8:2
	Rotap (5-min)	0.5	7.8	1.7	1:8:2
Oats	Hand (2-min)	1.6	5.5	2.9	2:6:3
	Rotap (2-min)	1.6	5.0	2.5	2:6:3
	Rotap (5-min)	1.5	5.8	2.6	2:6:3
Wheat	Hand (2-min)	4.8	4.2	0.9	5:4:1
	Rotap (2-min)	4.7	4.4	0.9	5:4:1
	Rotap (5-min)	4.6	4.4	1.0	5:4:1
Oats	Hand (2-min)	6.4	2.0	1.6	6:2:2
	Rotap (2-min)	6.4	2.2	1.4	6:2:1
	Rotap (5-min)	6.2	2.3	1.5	6:2:2

Agricultural Engineering Digest

A review of current literature on agricultural engineering by R. W. Trullinger, specialist in agricultural engineering, Office of Experiment Stations, U. S. Department of Agriculture. Requests for copies of publications abstracted should be addressed direct to the publisher.

Experiments on the Strength of Joints in Timber Structures [trans. title], O. Graf (Bauingenieur, 11 (1930), No. 16, pp. 277-282, figs. 26, abs. in [Gr. Brit.] Department of Science and Industrial Research (London) Building Science Abstracts, n. ser., 3 (1930), No. 7, p. 255).—Tests conducted at the Technical Academy of Stuttgart, Germany, on the strength of joints of timber structures are reported.

The results indicate that the reductions in load for the increase in the angle between the direction of the load and the grain, required by the regulations of the German Railway Company, are too great. These regulations specify maximum compressive stresses for soft woods according to the angle between the direction of the load and of the grain as follows: 80, 48, 24, and 15 kg per sq cm (1,140, 680, 340, and 214 lb per sq in) for angles of 0, 30, 60, and 90 deg, respectively.

The test specimens are illustrated by dimensioned drawings and photographs taken after failure, and the results are fully presented in tables and graphs.

Properties of Wood That Determine Paint Service of Exterior Coatings, F. L. Browne (Paint, Oil, and Chemical Review (Chicago), 89 (1930), No. 12, pp. 9-13, figs. 3).—In a contribution from the U.S.D.A. Forest Products Laboratory the author discusses the physical properties, microscopic structure, and chemical composition of wood in their bearing on the durability of paint coatings under normal conditions of exposure.

Charts are given showing the relative durabilities of paints as affected by wood species, density, grain direction, quality, climate, and paint composition. These demonstrate extreme variability in paint behavior and point to the necessity for further research in this field with a view to improving both paints and painting technic.

A Study of Ice Chests, F. R. Lanman (Ohio Station (Wooster), Bimonthly Bulletin 153 (1931), pp. 209-215).—A brief study is reported which was made to compare the temperatures maintained, the amount of ice melted, and the effect on the condition of certain foodstuffs in an ice chest having a ⅝-in cork-board insulation with one having no special provision for insulation except that supplied by paper and a so-called dead-air space, as in ordinary ice chests on the market.

The greater efficiency of the insulated chest as compared with the one having paper and air space was shown by the difference in (1) per cent of ice melted, (2) temperatures within the chests, (3) the ratio of increase in bacterial count of milk stored, and (4) the changes in condition of lettuce stored. In every respect the insulated chest was the better.

Factors Controlling Engine-Carbon Formation, W. H. Bahlke, D. P. Barnard, J. O. Eisinger, O. Fitzsimons (S.A.E. [Society of Automotive Engineers] Jour. (New York), 29 (1931), No. 3, pp. 215-222, figs. 14).—The results of studies are reported which show that the combustion chamber-carbon-forming properties of an oil are indicated with a satisfactory degree of reliability by its total volatility. A carbonizing index for engine oils can be obtained by determining the temperature at which 90 per cent has been evaporated in a simple distillation at an absolute pressure corresponding to 1 mm of mercury. The Conradson carbon residue value seems not to be a generally reliable carbonization criterion.

The Deposition of Dust on Walls, W. J. Hooper (Physics, 1 (1931), No. 1, pp. 61-68, figs. 5).—In a contribution from Battle Creek College, experimental proof is given of a thermal cause for the deposition of dust on plaster and lath walls wherein the course of the laths and rafters behind the plaster is outlined in dust. The thermal cause given is in agreement with the general theory of the behavior of small particles suspended in an atmosphere in which a temperature gradient exists. Experimental evidence is also produced to show that this phenomenon may be reduced to a negligible degree by thermal insulation.

"Celotex," Its Manufacture and Uses, E. C. Lathrop (American Institute of Chemical Engineers (New York) Transactions, 25 (1930), pp. 143-157).—This paper describes briefly the methods of manufacture of Celotex, and discusses its main properties and some of its more interesting uses.

Applications of Hydrogenation in Oil Refining, M. W. Boyer (American Institute of Chemical Engineers (New York) Transactions, 25 (1930), pp. 1-15, figs. 5). — This paper briefly describes the development and research work underlying the hydrogenation process as applied to the petroleum industry, and discusses some of the major applications with particular reference to fuel and lubricants for internal combustion engines. It is pointed out that the process may accomplish an increase or a decrease in the paraffinic character of the products as desired. It is possible to make paraffinic kerosene or an antiknock gasoline by the alteration of operating conditions such as temperature and hydrogen concentration. Thus the process presents the possibility of altering the carbon-hydrogen ratio and influencing the molecular structure of various petroleum fractions, at the same time removing undesirable sulfur compounds.

A Practical Underground Storage, D. Comin (Ohio Station (Wooster) Bimonthly Bulletin 153 (1931), pp. 215-223, figs. 4).—General information is given on the construction of underground storages for fruit and vegetables, together with working drawings and information relating to the construction of the experimental storage used at the station. This storage is 12 by 54 ft in plan and is built of reinforced concrete. Forced ventilation with an electric fan is used to supplement the natural ventilation.

Notes on Exploded Wood for Insulating and Structural Material, R. M. Boehm (American Institute of Chemical Engineers (New York) Transactions, 25 (1930), pp. 219-225, fig. 1).—A brief description is given of this material and its uses.

Effect of Resin in Longleaf Pine on the Durability of House Paints, F. L. Browne and C. E. Hrubesky (Industrial and Engineering Chemistry (Washington, D. C.), 23 (1931), No. 8, pp. 874-877).—Studies conducted at the U.S.D.A. Forest Products Laboratory are reported in which it was found that the behavior of coatings of house paint on well-seasoned boards of longleaf pine does not vary appreciably with the amount of resin visible in or extractable from the boards. The density of the wood and the width of its annual growth rings, on the other hand, were found to exert a marked effect on the durability of paint coatings.

Effect of Temperature on the Corrosion of Zinc, G. L. Cox (Industrial and Engineering Chemistry (Washington, D. C.) 23 (1931), No. 8, pp. 902-904, figs. 2).—Studies conducted at the Massachusetts Institute of Technology are reported the results of which indicate definitely that the corrosion rate of zinc in oxygenated distilled water over a range of temperature is controlled largely by the nature of the corrosion products film, rather than the temperature coefficient of the specific reaction rate of the corrosion process, the rate of transfer of oxygen through the liquid, or the oxygen solubility.

The Fool-Proof Poultry House (Missouri Poultry Station (Mountain Grove) Bulletin 38 (1931), pp. 35, pls. 2, figs. 21).—Several poultry houses found adapted to Missouri conditions are described and illustrated, and working drawings and bills of material for their construction are included. They are said to be the results of several years of testing and experimenting with practically all the styles of poultry houses in use in the country today.

Rural Electrification Development in Idaho, H. Beresford (Idaho Station (Moscow) Bulletin 180 (1931), pp. 84, figs. 103).—A summary is given of the results of studies on the use of electricity in agricultural practices as conducted by the station in cooperation with the Idaho Committee on the Relation of Electricity to Agriculture. Section 1 gives a statement of the progress of rural electrification in Idaho, and Section 2 describes the Idaho rural electrification project which was established at the Caldwell Substation farm. The studies deal with wiring, use of electricity in the farm home and dairy, silo filling, hay hoisting, feed grinding and forage processing, stock and poultry water heating, and the use of electricity in poultry production. A special section is devoted to the use of electricity for pumping for drainage and for supplemental irrigation, part of the studies of which were conducted in cooperation with the U.S.D.A. Bureau of Public Roads. A final section deals with new uses and methods for application of electricity to agriculture.

Surface Water Supply of the United States, 1928, III, XII (U. S. Geological Survey, Water-Supply Papers 663 (1931), pp. VIII + 245, fig. 1: 673 (1931), pp. VI + 172, fig. 1).—Of the papers which here present the results of measurements of flow made on streams during the year ended September 30, 1928, No. 663, prepared in cooperatoin with the States of New York, West Virginia, Ohio, Virginia, Illinois, Tennessee, North Carolina, and Alabama, covers the Ohio River Basin; and No. 673, prepared in cooperation with the States of Idaho, Oregon, Nevada, and Washington, the north Pacific slope drainage basins and the Snake River Basin.

Using the Harvester Combine for Navy Beans, E. C. Sauve (Michigan Station (East Lansing) Quarterly Bulletin, 14 (1931), No. 1, pp. 24-27, figs. 2).—Actual experience is related in the harvesting of navy beans with a combine, and data are reported on the performance of combines as compared with bean hullers

and grain threshers. The latter indicate that the loss of beans in the pods which pass through the machine lessens as the number of cracked beans increases. The regular bean thresher produced a considerable percentage of splits. It would appear that both the combine and the bean thresher need further mechanical improvements.

Cost data are also included.

Prevention of Valve-Seat Erosion, E. M. Getzoff (S.A.E. [Soc. Automotive Engin.] Journal (New York), 29 (1931), No. 4, pp. 332-335, figs. 7).—A theory for the cause of the thin spotty deposit on the valve seats of internal-combustion engines which accelerates erosion is advanced, and the results of investigations summarized which indicate that this deposit is absent on valve seats made of nonferrous metal. Aluminum bronze gives satisfactory results but is difficult to secure to cast-iron cylinder blocks because of its greater coefficient of expansion. Several other more successful methods of securing aluminum bronze rings to cast iron are briefly described.

Method to Tell Power Stream Will Furnish, W. H. Sheldon (Michigan Station (East Lansing) Quarterly Bulletin, 14 (1931), No. 1, pp. 16-19, figs. 3).—A method is described for determining the amount of power which a small stream is capable of developing, which involves the use of a temporary weir dam with a rectangular notch.

Graphic data are included on the width of the weir, depth of the water flowing over the weir, available head, and horsepower developed.

Operating Water Pumps with Electric Power, T. E. Hienton (Indiana Station (La Fayette) Circular 184 (1931), pp. 4, figs. 3). —Practical information is presented on the subject.

Sewage Disposal for Rural Dwellings (Ohio Agricultural College (Columbus) Extension Bulletin 112 (1930), pp. 24, figs. 20).—Practical information is given on the design of sewers and sewage treatment plants for rural residences having less than 10 inhabitants. The general features involved in sewage disposal are discussed, and the most satisfactory methods adaptable under the conditions concerned are presented.

The Trench Silo in Nebraska, I. D. Wood and E. B. Lewis (Nebraska Agricultural College (Lincoln), Extension Circular 713 (1931), pp. 16, figs. 13).—Practical information on the construction of trench silos is presented.

Tests of Spray Irrigation Equipment, F. E. Staebner (U. S. Department of Agriculture Circular 195 (1931), pp. 30, figs. 28).—The results of tests of typical German and American spray-irrigation equipment to determine the uniformity of the water distribution over the surface are reported, and the methods of testing and the experimental apparatus are described.

Results indicate that more uniform distribution over a large area can be obtained with the overhead-pipe system than with any other type of spray-irrigation equipment now available. This is due to the fact that each unit wets an approximately rectangular area and when properly handled will wet it quite uniformly. Furthermore, the areas irrigated by adjacent units join without serious overlaps or gaps.

Some merit was established for the German idea of a sprinkler intended to wet a square area. However, the two types of square spray nozzles tested failed to accomplish this aim to an extent that their introduction into this country is not warranted. The distribution accomplished by two of the circular sprinklers was reasonably uniform, but under most of them it was poor.

Some Studies of the Need for Irrigation, O. E. Robey (Michigan Station (East Lansing) Quarterly Bulletin, 14 (1931), No. 2, pp. 71-76, figs. 3).—The results of a study of the rainfall of the Michigan area are reported and discussed with reference to the need for supplemental irrigation, especially for such crops as potatoes.

The data available indicate that at least 12 in of water are needed for potatoes during the months of June, July, and August in the area. It appears that supplemental irrigation may be advantageous where the rainfall data show too long intervals between rains.

Agricultural Engineering, S. J. Wright (In Agricultural Research in 1930. London: Royal Agricultural Society, England, 1931, pp. 81-107).—This is a review of the progress of research in agricultural engineering, more especially in European countries during 1930, it being a contribution from the Institute for Research in Agricultural Engineering of Oxford University. It contains sections on the testing of agricultural machinery, drainage, power, and agricultural implements.

Electric Heating, J. C. Woodson (Scranton, Pa.: International Textbook Co., 1931, pts. 1-2, pp. IV + 83 + 54, figs. 58). — This book consists of two parts. Part 1 deals with the theory of heat, fundamental units of heat and heat terms, heat transfer, electric heating elements, refractory materials, and heat-insulating and resisting materials. Part 2 deals with domestic, commercial-cooking, and industrial appliances.

Potato Storage on 259 Farms in New York, A. L. Wilson and E. V. Hardenburg (New York Cornell Station (Ithaca) Bulletin 526 (1931), pp. 58, figs. 27).—This bulletin presents the results of a survey made to determine the types of potato storages being used, their efficiency, and the extent of their use during the storage seasons of 1927-28 and 1928-29.

The survey covered a total of 259 farm storages. The survey records involve 144 house cellars, 44 barn basements, 54 bank storages, and 17 special structures situated in 20 New York counties. House cellars were found to constitute the most common type of farm storage and are generally distributed over the entire state. The average capacity varies from the smallest in house cellars to the largest in the special storages. The principal defect in existing storage structures appears to be lack of provision for the removal of excess moisture during a part of the storage period.

Temperature control is not a serious problem in most storages. The humidity was found to be the highest in bank storages and the lowest in house cellars. Shrinkage, which is assumed to be the best measure of storage efficiency, averaged 6.38 per cent for house cellars, 5.97 per cent for barn basements, 5.13 per cent for special storages, and 2.69 per cent for bank storages. It was found that shrinkage in the four types of storage is directly proportional to average temperature and inversely proportional to humidity.

The details of construction of walls, floors, ceilings, insulation, doors, windows, and ventilation and temperature control equipment are described and discussed for each of the four types of storage. Four of the bank storages studied are described, illustrated, and discussed in considerable detail, and plan and elevation drawings and drawings of certain structural details are presented, together with bills of material and estimated costs.

Measuring Water in Irrigation Channels, R. L. Parshall (U. S. Department of Agriculture, Farmers' Bulletin 1683 (1932), pp. 18, figs. 7).—This bulletin supersedes Farmers Bulletin 813. It presents information which is based on the results of studies conducted in cooperation with the Colorado Experiment Station. It describes different types of weirs and their use and gives tables of data for discharges under different conditions. The Parshall measuring flume also is described and illustrated, and tabular data given on dimensions and capacities for various crest lengths and for discharges under different conditions. It is stated that the Parshall measuring flume is more difficult to construct and install correctly than weirs, but it will measure water accurately in channels carrying silt or having comparatively slight fall.

Controlling Small Gullies by Bluegrass Sod, R. H. Uhland (U. S. Department of Agriculture Leaflet 82 (1931), pp. 4, figs. 3).—Practical information is given on the subject.

[Agricultural Engineering Investigations at the New York Cornell Station] (New York Cornell Station (Ithaca) Report 1931, pp. 13-15).—The results of investigations on the heating and ventilation of animal shelters, farm power machinery, and insulated concrete milk-cooling tanks are briefly presented.

In the ventilation studies it has been found possible to equip the ordinary farm barn with a homemade ventilation system at approximately 40 per cent of the cost of other natural draft systems. The poultry house ventilation studies indicate that the handling of the birds is the deciding factor so far as floor space per bird is concerned, and that for a 20x20 ft pen 2.66 sq ft is the minimum to which the area per bird can be reduced.

The studies of sizes of insulated concrete milk-cooling tanks resulted in the selection of a ratio of water to milk of 3 : 1. A thickness of 3 in of cork insulation was found to be the most desirable.

Report of Structural Steel Welding Committee of the American Bureau of Welding (New York: American Welding Society, 1931, pp. 208, figs. 85).—This report deals with the results of an investigation extending over a period of five years, the principal object of which was to determine the stresses that may be used safely in the designing of welded steel structures fabricated under ordinary fabricating shop conditions. A series of conclusions and recommendations are presented, and appendixes deal with analysis of bar steel, qualification of welders, filler metal, and design, fabrication, and test data for program specimens.

A.S.T.M. Tentative Standards, 1931 (Philadelphia: American Society for Testing Materials, 1931, pp. 1008, figs. 177).—This volume contains the 180 tentative specifications, methods of test, definitions of terms, and recommended practices in effect during 1931.

The Construction of Cow-Houses ([Great Britain] Ministry of Agriculture and Fisheries (London) Bulletin 40 (1931), pp. 22, pls. 2, figs. 9).—This is a revision of an earlier publication and gives practical information on the planning and construction of cow houses from the English viewpoint. Suggested detailed drawings for specific structures are included, together with working plans for single- and double-range cow houses.

Effect of Priming-Coat Reduction and Special Primers Upon Paint Service on Different Woods, F. L. Browne (Industrial and Engineering Chemistry (Washington, D. C.), 22 (1930), No. 8, pp. 847-854, figs. 4).—Studies conducted at the U.S.D.A. Forest Products Laboratory on the effect of methods of priming on the durability of paint coatings on seven species of softwoods are reported.

It was found that a marked variation in the proportions of linseed oil and of turpentine in the priming coat failed to alter appreciably the durability of the coatings on any of the seven woods. The durability of paint coatings on southern cypress was not improved by replacing turpentine with benzene in the reduction of the priming coat.

The incorporation of red lead in priming paints hastened the flaking of the coatings from summer wood. A special priming paint containing zinc dust and zinc oxide decreased the durability of white-lead paint and failed to increase that of lead and zinc paint, although it improved the appearance of both paints. The addition of zinc dust to the standard primer caused effects similar to those of the zinc dust and zinc oxide primer. The addition of a small amount of aluminum powder to primers was practically without effect. Aluminum paint as a primer under top coats of white lead and of lead and zinc paint increased the durability of the coatings markedly.

Special Primers for House Paints, F. C. Schmutz, F. C. Palmer, and W. W. Kittelberger (Industrial and Engineering Chemistry (Washington, D. C.), 22 (1930), No. 8, pp. 855-860, figs. 7).—This paper deals with the problem of bonding of paint and wood from the viewpoint of the vehicle used, and shows that varnish in the priming coat affords much better adhesion than vehicles now generally used. This improvement holds regardless of the type of pigment used in combination with the vehicle.

Knock Rating of Straight-Run Pennsylvania Gasoline in Relation to Boiling Point, Density, and Index of Refraction, M. R. Fenske (Industrial and Engineering Chemistry (Washington, D. C.) 22 (1930), No. 8, p. 913).—This is a brief preliminary report of studies in progress at the Pennsylvania State College, the object of which is to fractionate Pennsylvania straight-run gasoline more thoroughly than has been done before. Typical fractions were tested for knock characteristics by the bouncing-pin method. In some instances where several fractions were taken at the same temperature remarkable variations in density, refractive index, and knock rating were obtained. In general, the fractions having the lowest densities and refractive indexes had the highest ratings, and vice versa.

Master Specifications for Good Carpentry Construction (**American Builder and Building Age** (New York) 52 (1932), No. 4, pp. 50-54, figs. 17).—The text of these specifications is given, together with drawings and standard details for house framing.

Paint Thinners.—II, Results of Accelerated Weathering Tests of White House Paints Reduced with Different Types of Thinners, H. K. Salzberg, F. L. Browne, and I. H. Odell (Industrial and Engineering Chemistry (Washington, D. C.), 23 (1931), No. 11, pp. 1214-1220, figs. 8).—The results of accelerated weathering tests of white house paints reduced with different types of thinners as conducted at the Mellon Institute of Industrial Research are reported. The paints were applied to groups of white-pine and southern yellow-pine panels. It was found that ordinary turpentines contribute slightly more to the durability of paint coatings than do mineral spirits, regardless of the type of crude oil from which the mineral spirits is obtained or its content of saturated and aromatic hydrocarbons.

In thinning paints of which zinc oxide is a component, slightly more turpentine than mineral spirits may be added to reach the same consistency. Checking of coatings of straight white-lead paint on southern yellow pine did not appear so soon when the thinner was an oxidized turpentine as it did when the thinner was ordinary turpentine, or a petroleum or coal tar distillate. The initial gloss of the coatings, the rate of loss in gloss, discoloration by yellowing of paint oil, the rate of chalking, and the exudation of resin were not affected by the choice of paint thinner.

It was found that the ratio of oil to thinner in the paint mixture can be varied within wide limits without appreciably affecting the durability of paint coatings on white pine.

Laboratory Tests of Reinforced Concrete Arches with Decks, W. M. Wilson (Illinois University (Urbana), Engineering Experiment Station Bulletin 226 (1931), pp. 100, figs. 53).—Tests of reinforced concrete arches and studies made with celluloid models are reported, and the results are presented in detail. They are too extensive for reproduction.

Electricity on the Farm and in Rural Communities (Revised Edition), compiled by L. C. Prickett (C.R.E.A. Bulletin [Chicago], 7 (1931), No. 1, pp. 332, figs. 431).—This is a contribution from the Committee on the Relation of Electricity to Agriculture. It presents material which represents a summary of the best available informaton at the command of the committee, on the subject. Much of this material has been obtained from the state agricultural experiment stations.

Effects of Bending Wire Rope, F. C. Carstarphen (American Society of Civil Engineers (New York) Proceedings, 57 (1931), No. 10, pp. 1439-1466, figs. 11).—This is a technical analysis of the effects of bending wire rope in which new and comprehensive formulas are presented. An appendix contains the nomenclature used.

The Regulation of Drilling Depth [trans. title], H. Schwarz (Die Technik in der Landwirtschaft (Berlin), 12 (1931), No. 11, pp. 292, 293, figs. 3).—Experiments conducted at the University of Breslau on the regulation of drill shares in small grain planting are briefly reported.

It was found that the relative penetration of a share is somewhat independent of the strength and thickness of the share point, as this factor may be influenced by weighting for almost any type of point. However, the uniformity of penetration increased as the depth of penetration increased.

The saber type of share was found to penetrate less and more uniformly than other types owing to its long cutting edge and was especially useful in these respects in soils of nonuniform looseness and resistance to penetration. Under these conditions share performance improved as the shape varied from that of the normal share and approached that of the saber share. In this connection the best results in depth regulation were secured by the use of an auxiliary drill sled bolted to the front of a saber share and adjustable vertically.

Draft Eveners and Multiple Hitching [trans. title], C. W. Arens (Die Technik in der Landwirtschaft (Berlin), 12 (1931), No. 12, pp. 302-305, figs. 15).—Different eveners and methods of multiple hitching are described and illustrated.

Investigations of the Agronomic Basis for Mechanical Single Kernel Seeding and Broadcasting of Grain [trans. title], W. Heuser (Die Technik in der Landwirtschaft (Berlin), 12 (1931), No. 12, pp. 305-307).—Experiments on the planting of rye by drill, by broadcasting, and by single kernel seeding, uniformly spaced, are reported.

Single kernel seeding spaced 2.5 cm (1 in) apart resulted in the best yield and the best utilization of a controlled amount of nitrogen fertilizer. Since the drill moved at the rate of 1 meter per second it would be necessary for it to drop the seed grain at the rate of 40 per second at 1-in intervals in order to meet this requirement.

The Behavior of Different Kinds of Grain in Grinding [trans. title], E. Schilling (Die Technik in der Landwirtschaft (Berlin), 12 (1931), No. 12, pp. 308-310, figs. 4).—Experiments on the grinding of winter and summer barley, rye, wheat, oats, peas, and beans are reported. The results indicate that the distribution of particle sizes in the ground product will vary widely for different grains ground in the same mill. This appears also to hold for feeding value and power required for grinding.

It was found that the effective production of bran by a feed mill will vary as much as 200 per cent with different grains. This is due not only to the variable power requirement but also to the fact that the construction of the grinding elements has an influence. This was especially true when grinding oats, it being found that some grinding elements are not adapted to oats grinding.

The Treatment of Plowshares by Farm Smiths [trans. title], W. Kloth (Die Technik in der Landwirtschaft (Berlin), 12 (1931), No. 12, pp. 310, 311, figs. 5).—Tests of 100 different plowshares conducted by the Agricultural Academy of Berlin showed defective heat treatment and working of the cutting edges in a majority. Hardness defects were especially evident and suggestions for improving this situation are given.

Improved Paraffin-Base Lubricating Oils, G. H. B. Davis and A. J. Blackwood (Industrial and Engineering Chemistry (Washington, 23 (1931), No. 12, pp. 1452-1458, figs. 6).—A study of dewaxing paraffin-base oils indicates that, in order to obtain the advantages of low-pour oils (pumpability and quick distribution at low temperature) by this method, it is necessary to degrade the oil to some extent in most of its other characteristics, namely, (1) decrease the viscosity index of the oil with resultant increase in difficulty of starting, (2) increase the carbon-forming tendency of the oil by removal of the wax, (3) increase the volatility of the oil, which causes increased oil consumption in the engine, (4) decrease the lubricating characteristics of the oil as indicated by lessened load-carrying ability and "oiliness," and (5) decrease oxidation stability with consequent sludging in the engine and other deleterious effects.

It has been found that by the use of small quantities of a pure hydrocarbon lubricant it is possible to reduce the pour point of paraffin-base oils and to obtain the advantage of low-pour oils without impairing the other desirable characteristics of the oils.

Exhaustive tests show that the low-pour oil thus produced is entirely stable and has no unexpected or unusual effect upon the engine and is somewhat superior to the original oil with regard to lubricating characteristics.

Report on the Activities of the Institute for Agricultural Machinery [trans. title], [C. T.] Dencker, Wriede, Segler, and Dienst (Jahresbericht Preussens Landwirtschaft Versuchs und Forschungsinstitutes Landsberg. a. d. Warthe, 1930-31, pp. 98-107).—A brief summary is given of the program of investigation conducted by the institute on hay and straw blowers, cultivating machinery, potato harvesting machinery, and on the use of electricity in agriculture. A list of 15 published reports of studies on these machines, mostly by the senior author, is included, together with a list of unpublished reports.

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Notes on the Annual Meeting

MORE THAN 200 MEN of assorted special interests and stages of development in the agricultural engineering profession steeped themselves in the saturated atmosphere of agricultural engineering ideas, information, and personalities which pervaded Ives Hall incident to the 26th Annual Meeting of the American Society of Agricultural Engineers, at Ohio State University, June 20 to 23. They came alert, to learn, to develop the profession, and to develop with it. They made it a strenuous meeting. Interest dictated long sessions. They "talked shop" between sessions. Apparently they were stimulated by the urgency of current agricultural and general economic conditions. Some apparently felt a need of making the profession's justification more self-evident than ever. They carried through the advance plans to emphasize "higher values." They made it, more than ever, a work meeting, and a profitable one for all who were fortunate enough to be present.

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It is apparently easy for agricultural engineers to talk in general terms of the social and economic implications of our work; to proclaim the superior nature of our training and ability to analyze; to decry our failure to assume a leadership. We likewise speak with facility and scientific exactness in technical terms on technical subjects. It is less easy, however, to interpret the economic and social significance of new specific technical advances or problems; and to apply scientific accuracy to our social and economic thinking.

Did the Meetings Committee exercise some deep psychology in this connection in building the program? By building up a tremendous momentum of synchonized social and economic thought along a particular line in from one in two hundred minds, and suddenly switching the program to technical subjects, could it induce a carryover of the social and economic emphasis to specific technical subjects? By changing the subject suddenly from the technical to the social and economic could it effect a carryover of scientific sagacity into realms ordinarily clouded by emotional thinking?

The program built up the momentum of thought. It changed the direction of thought abruptly and frequently from technical means to social and economic significance and back again. Whether or not it effected any carryover or bridging between the two must remain a matter of conjecture. Opinion seemed unanimous, however, that it was a well-balanced, timely, constructive, significant program, well-worth attending, possibly better than any previous program of the Society.

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Some of the non-members on the program showed keen appreciation of the opportunities and activities of agricultural engineers in terse sentences well worth repeating.

Dr. Jardine's closing sentence was a carefully worded urge to leadership. He said, "As a future policy I hope that you as engineers, individually and as an organization, will go even further than might reasonably be expected of you, and actively promote effective, coordinated application of science and scientific method to the end that there will be not only policy and direction in progress but coordination of the physical, biological, economic, and social forces at work in the interests of agriculture."

The address of Extension Director R. J. Baldwin was eloquent on the extent of the agricultural engineers' field and opportunities. The audience could appreciate the effectiveness of agricultural engineering extension in Michigan after hearing him say, "Speaking in a broad way, we may agree that it is the responsibility of the agricultural engineer to make farm equipment serve a progressive agriculture and rural home life . . . . His field is always so wide and so many things need his thought and leadership, that the trail ahead is full of alluring opportunities . . . . . His program must progressively lead toward a simplification of services to agriculture, toward efficiency in the physical equipment of the farm, and most of all toward the higher standards of living through improvement of those things which help to bring to farm people the fundamental satisfactions and comforts of life."

Representing leading farmers more directly than any other speaker, M. S. Winder, in his paper says, " . . . . . I want you to know that the American Farm Bureau Federation is intensely sympathetic to the work which you are doing in remaking American agriculture . . . . . I am not sure that the American farmer yet realizes the essential part which the engineer plays in his affairs."

Dr. George W. Rightmire in his address of welcome pointed out that " . . . . . the business of agricultural engineering is an expanding one."

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Cooperation between agricultural engineers and other technical and scientific workers was emphasized as of increasing importance with impressive frequency. After being aired in the premeeting extension and research conferences, special attention was focussed on it again by Baldwin, Amundson, Moses, Trullinger, Reed, Jardine and others.

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Just how deeply rooted in science agricultural engineers may become was dramatically suggested by L. H. Hawkins, executive engineer in the research laboratories of the General Electric Company. His address emphasized the growing general engineering and agricultural engineering applications of what he called "a train of ripples in a nonexistent probability"—in other words, the electron.

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How unrelenting are our responsibilities to society, on the other hand, President Fletcher pointed out in his address in these words: "The engineer, however, must accept a large responsibility for the solving of the problems arising from the machine's displacement of muscular energy. After all, progress may be defined as the continuous solving of today's problems which have arisen from the solution of the problems of yesterday."

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It is impossible to comment in this short space on more than a few of the interesting, inspiring and thought-provoking phases of the meeting. It is hoped they may stimulate further progress in the emphasis in "higher values" which is to be continued throughout the new Society year.

A.S.A.E. and Related Activities

Social and Economic Values Emphasized at 26th Annual Meeting

FREQUENT, outspoken expression on "higher values" in agriculture resounded through the halls and corridors of Ives Hall, the agricultural engineering building at Ohio State University, June 20 to 23, when it was the scene of the American Society of Agricultural Engineer's twenty-sixth annual meeting. An appreciative audience applauded speaker after speaker for presenting ideas on the opportunities and obligations of agricultural engineers in the present economic situation. Economic and social emphasis was patent in the College Division and technical sessions as well as in the general sessions which were specially devoted to these considerations.

All signs on the University campus led to Ives Hall, which by the opening morning was a dressed-up center of activity for the meeting. Registration was conducted in the south laboratory. The Ohio Student Branch of the Society also operated a quick lunch and soft drink counter there for the convenience of the visitors. Technical division committee exhibits occupied the main laboratory space, under the skylights, and College Division committee exhibits were placed in the south hallway on the second floor. Some of the equipment which regularly occupies the building, including the new Ohio dynamometer, was also on display.

A temporary stage, numerous twelve-inch replicas of the Society's gold and blue emblem, crepe paper streamers of like color, park benches and folding chairs made a main meeting room of the large machinery display room on the second floor. The park benches proved to be the most comfortable seats and President Fletcher, after the first day, had them placed at the front of the room to bait the crowd forward. The research men quickly found that of the folding chairs the six-slatters" were much easier riding than those with only five slats in the seat. B. Parker Hess proved himself a highly practical electrification specialist with a keen appreciation of human values when he installed four large fans in this room to help keep the audience comfortable.

When two or more meetings were scheduled for the same time the smaller groups held their sessions in classrooms. Demonstrations and explanations of the exhibits were stopped while sessions were in progress.

Neil Hall, the University's newest and largest dormitory, where most of the out-of-town people stayed, became the most important sub-center of meeting activity. Many of the research and extension men and their families spent the greater part of Sunday in its comfortable lobby visiting, playing cards, and welcoming the main meeting crowd, who literally "rolled in" Sunday afternoon and evening.

For the women and children Neil Hall was the starting and stopping point of many little excursions to places of interest in and about the city. They reported by their actions and expressions, as well as by words, that they were very enjoyably entertained by the wives of the Columbus A.S.A.E. members.

A post-meeting count shows a grand total of 235 registered, without counting the wives and children.

It seemed to be the consensus of opinion, as the close of the meeting approached, that the program packed more interesting, timely features into four days and three evenings than any of the previous program successes of the Society.

The College Division, with Chairman C. E. Seitz presiding, following its program to the letter, opened with committee reports which were short and to the point. R. J. Baldwin, director of agricultural extension at Michigan State College, in his address on "The Place of the Agricultural Engineer in Agricultural Extension" showed an understanding appreciation of the work, the opportunities, the problems, and the obligations of agricultural engineers that drew prolonged applause and an urgent demand for the early publication of his paper. In the afternoon George Amundson counseled cooperation between college and commercial extension workers; B. D. Moses pointed out the value and method of obtaining the cooperation of other subject matter departments in agricultural engineering research; and R. W. Trullinger brought down to date his viewpoints on the future development of agricultural engineering research.

Special group meetings were too numerous to be reported in detail. College and commercial extension workers held their scheduled Monday evening dinner session at Pomerene Hall, and from the conversation and applause overheard, seemed to be cooperating effectively. The student group session, sponsored by the Committee on Student Branches, chairmanned by Aldert Molenaar, student member from Nebraska, with a gathering of about 20 students from five schools, some interested faculty members, and officers of the Society present, carried out the most ambitious and successful program of its kind ever attempted in the A.S.A.E. The Society Council, Meetings Committee, Jury of Awards, and various other committees met at intervals throughout the four days.

G. W. McCuen, chairman of the Committee on Local Arrangements, called to order the Tuesday morning general session and introduced Dr. George W. Rightmire, president of Ohio State University, who welcomed the Society as an enthusiastic group, meeting an expanding need, and one which would stimulate the University by holding its meeting there.

Leonard J. Fletcher, in the president's annual address, definitely opened the meeting to consideration of the economic and social aspects of agricultural engineering with a volley of ideas and illustrations along that line.

M. L. Wilson followed, calling attention to "Some Economic Aspects of an Engineered Agriculture" in a manner which humbled the engineers with a new vision of their responsibilities.

Then the program took a shift toward the technical with the presentation of R. B. Gray's paper on "Artificial Drying of Agricultural Products," and of C. O. Reed's on "Fertilizer Application for Corn Production."

Wednesday morning's general session on "An Engineer's Policy for Agriculture" brought the Society back to its economic and social emphasis. In the absence of Arthur Huntington, his paper, which urged engineers to show more leadership, was read by Dr. E. A. White. In addition to its applause, the audience, upon motion, by a unanimous standing vote, instructed the secretary to send Mr. Huntington immediately a telegram of appreciation.

J. T. Jardine, chief of the U.S.D.A. Office of Experiment Stations, put cooperation with other scientific and technical agricultural workers as a first consideration in any policy of engineers toward agriculture. He pointed out that the policy should be such that all these workers could agree on its main points.

Many of the audience were primed and waiting for the discussion which followed these addresses. J. A. King, Fred Wirt, and J. B. Davidson presented prepared discussions on different angles of the problem.

President Fletcher then closed this discussion to allow time for the report of the Resolutions Committee. One paragraph, supporting the Home Loan Bill before Congress at the time, drew opposition on the principle that the Society should not take sides on

controversial questions of that nature, as well as on the merits of this particular bill. The Society finally voted to strike out this paragraph and passed the resolutions as follows:

The 26th annual meeting of the A.S.A.E. has attained new heights of achievement for the society. This meeting not only has been one which has contributed greatly to the intellectual and professional interest of those in attendance but also has been one to be remembered as a delightful and pleasant experience. We would like to express our sincere appreciation of the efforts of those who have in a painstaking way contributed to the success and pleasure of the meeting. Particular mention is to be made of the great institution and its administrators, President Rightmire and others, who have placed at the disposal of the Society the splendid facilities which have contributed to the convenience and efficiency of the meeting. Particular appreciation is to be expressed to the local committee on arrangements, G. W. McCuen and his associates, who so carefully and unstintingly have given of their time and effort to prepare in utmost detail the general arrangements for the meeting and for the convenience and comfort of those in attendance. In expressing our thanks we would like to congratulate the local committee on its outstanding achievement.

The program this year has furnished a large number of exceptional, timely and interesting papers and withal there has been a most satisfactory balance of subject matter of interest to the various groups in our society, and thanks are extended to Dr. E. A. White, chairman of the Meetings Committee, the division chairmen and the other members of the committee who have so carefully arranged the program.

The excellence of our program has been greatly enhanced by the contributions from several eminent scientists and research engineers. Particular mention is to be made of the papers and addresses of R. J. Baldwin, director of extension, Michigan State College; M. L. Wilson, agricultural economist, Montana State College; L. A. Hawkins, executive engineer, General Electric Company; L. M. K. Boelter, professor of mechanical engineering, University of California; W. B. Roberts, Aluminum Company of America; J. T. Jardine, chief, Office of Experiment Stations, U.S.D.A.; L. D. Baver, associate professor of soils, University of Missouri; and Thomas Midgley, department of chemistry, Ohio State University.

The exhibits have lent emphasis to recent scientific developments and their application to efficiency and economy of practice in various fields of agricultural engineering.

Cognizance should be taken of the fact that this year the Society, through the generosity of the donors, is permitted to award, for the first time, the Cyrus Hall McCormick medal, given for exceptional and meritorious engineering achievement in the interest of agriculture.

It is to be recognized, in this period of economic stress, that the expenditures of public funds should be carried out with extreme care to insure maximum efficiency and economy. However, the society desires to emphasize that reduction in expenditures should be made with extreme caution to insure that the productive and constructive activities of public agencies shall not be greatly injured or curtailed. In our judgment it would be the height of folly to discontinue at this time education, both resident and extension, and research in a way which would materially reduce our progress as a nation, greatly limit the development in the great industry of agriculture, and jeopardize the welfare of the people engaged therein.

During the past few years the Office of Experiment Stations, U. S. D. A., has given advice and assistance, through the various experiment stations, on the organization, planning and conduct of research projects in agricultural engineering. The American Society of Agricultural Engineers has appreciated and benefitted greatly by this assistance. We take this occasion, therefore, to request that the Chief of the Office of Experiment Stations, U.S.D.A., continue and enlarge this service.

Respectfully submitted,

J. B. Davidson
O. B. Zimmerman
W. G. Kaiser.

Thursday morning's session, opening with L. A. Jones' paper on "The Engineer and Soil Erosion Control"; followed by the reading by Dr. E. A. White of M. S. Winder's address on "How the Farmer Looks at the Engineer"; and by F. W. Duffee's paper on a "Specific Example of a Planned Engineered Agriculture," revived the discussion of social and economic phases of agricultural engineering. It developed an informal debate on large-scale and corporation farming.

Shortage of time again forced the closing of this discussion. The session was concluded by President Fletcher calling President-Elect Chas. E. Seitz to the platform and officially turning the gavel over to him. When the applause subsided, President Seitz said he felt highly honored and that he would try to justify the responsibility placed upon him. He called upon the Society to give him the same loyal support it gave to President Fletcher.

The annual business meeting of the Society was called to order Tuesday evening at 7:45. The minutes of last year's meeting were read and approved.

President Fletcher read a letter of greeting and of regret at being unable to be present from Dr. C. H. Dencker, head of the department of agricultural engineering, Landmaschineninstitute, Landsberg (Germany) and Dr. N. L. Wallem, also a prominent German agricultural engineer. Dr. Wallem studied mechanized agriculture in America in 1930 and 1931, together with Dr. Dencker during the latter year. They attended meetings of the Society while here and in these and other contacts made friends with many American agricultural engineers.

Dr. E. A. White, chairman of the Meetings Committee, expressed his appreciation of the cooperation of the other members of the committee, and a hope that the committee this year had made some progress in the matter of meeting organization, on which future committees may build.

President Fletcher announced the organization of a Canadian Section of the A.S.A.E. during a recent meeting of Canadian members at which he was present.

The Secretary-Treasurer's report this year, by arrangement between President Fletcher and Secretary Olney, covered the detailed review of progress for the year which has previously been given in the president's annual address. A discussion on advertising in the Society's Journal followed. J. A. King moved that the Society express formally to advertisers in its Journal, appreciation of the character of this advertising. Col. O. B. Zimmerman suggested that the Secretary's report be made available, particularly for the information of Society officers and committee members during the new Society year. The report was then accepted.

C. E. Seitz announced that organization of committees and plans for the next annual meeting were well under way. E. R. Jones, chairman of the Meetings Committee for next year, elaborated with definite information that the Purdue meeting is scheduled for Wednesday, Thursday, Friday and Saturday, June 21-24, 1933. Engineered rural life, or improving rural life through engineering, is the theme he announced for the next annual meeting. He invited suggestions for the meeting from the members.

Wm. Aitkenhead told of the Purdue tradition for hospitality and of its ideal facilities for handling the meeting next year.

President Fletcher's call for the opinions of those present showed a majority in favor of the dates named for the Purdue meeting; opposed to any premeeting conferences; and in favor of the Society's participation in the engineering program at Chicago, June 28, in connection with the Century of Progress Exposition.

The meeting was temporarily adjourned at 9 o'clock to hear the broadcast of the Sharkey-Schmeling heavyweight championship boxing match. Reception of the broadcast in the meeting room was made possible by and with the compliments of the Society's Committee on Fuels and Lubricants.

Speaking for the Pacific Coast Section Ben D. Moses announced, when the meeting was resumed, that it has selected Asilomar, California, on the ocean side of the Monterey Peninsula, as the site for the annual meeting in 1934.

W. A. Clegg, chairman of the Southern Section, supplemented placard propaganda with a verbal invitation to the Society to hold its 1935 annual meeting somewhere within the boundaries of that Section. R. H. Driftmier, head of the agricultural engineering department at the University of Georgia, and J. B. Kelley, head of the agricultural engineering department at the University of Kentucky, offered their respective institutions as desirable meeting places within the Southern Section area.

The Society's Annual Dinner was held at Pomerene Hall. Daniel Seltzer, president of the Ohio Cultivator Company and of the National Association of Farm Equipment Manufacturers, was toastmaster. A varied program of

vocal and string music entertained throughout the dinner. The presentation of the McCormick Medal to Major O. V. P. Stout on this occasion is reported elsewhere in this issue. The address of E. J. Stirniman on his observations in Russia, illustrated by slides of photographs which he himself took, proved highly entertaining and informative.

Space does not permit reporting the technical division sessions. The plan of scheduling their sessions during the latter three afternoons and in two periods with some joint sessions and not more than two sessions in progress simultaneously, seemed to work out well. The Rural Electric Division, which has not been holding winter meetings, was probably the most active and was the last to adjourn Thursday afternoon.

Agricultural Engineering Emphasized in Soil and Water Conservation Conference

THE Southwest Soil and Water Conservation Conference held its third annual meeting at the University of Arkansas, College of Agriculture, at Fayetteville, June 9 and 10, 1932. This meeting was largely attended by agricultural engineers, and much of the program consisted of papers and discussions by them. C. E. Ramser, L. A. Jones, R. W. Baird, A. K. Short, C. V. Phagan, J. W. Carpenter, M. R. Bentley, L. E. Haben, and G. E. Martin participated in the program.

T. Roy Reid, assistant director of agricultural extension, University of Arkansas, was elected president of the Conference for the coming year.

The principal themes of the program were the progress of the soil-erosion experiment stations, the relation of college extension and vocational agriculture to erosion control, and technical developments in methods.

Premeeting Conferences Well Attended

MORE than 80 agricultural engineers representing largely the state colleges, experiment stations, and the U. S. Department of Agriculture, registered for the conferences on agricultural engineering extension and research sponsored by the College Division of the American Society of Agricultural Engineers and held at Ohio State University, Columbus, just previous to the Society's 26th annual meeting. Attendance was almost evenly divided between the extension group which met June 16, 17 and 18, and the research men who held their conference to the latter two of those days.

Lively discussion characterized both meetings. Some extension men were noted visiting the research sessions, and vice versa. This was commented on as a healthy tendency.

Benefits of the extension agricultural engineers' conference at Urbana two years ago were reflected in this year's meeting in favorable reports of results achieved by following recommendations made at that first conference. A two-year proof period was, in effect, concluded at the recent meeting with assuring accounts of the effectiveness and applicability of extension practices which represent progressive steps in this field.

The research conference, on the other hand, was the first of its kind and started from scratch with an attempt to define its basic terminology. Open discussion was supplemented with one address presenting the commercial viewpoint on research, by Dr. D. P. Barnard, assistant general director of research and in charge of automotive engineering research for the Standard Oil Company of Indiana. Wh'le no conclusive immediate action or recommendations resulted from the conference, it stimulated an exchange of ideas which all present felt to be highly worth while.

In Friday evening's joint session of extension and research men, the emphasis was, as scheduled, on studying the agriculture to which their efforts are to be applied, and on coordinating research and extension.

Saturday evening the Ohio men diverted their guests' attention to lighter channels by entertaining them at a picnic. When rain prevented holding the event outdoors as originally planned, tables were set in Ives Hall. Nearly one hundred were present for the supper, which put them in a jovial mood for a sociable evening. Registration for the Society's annual meeting was started.

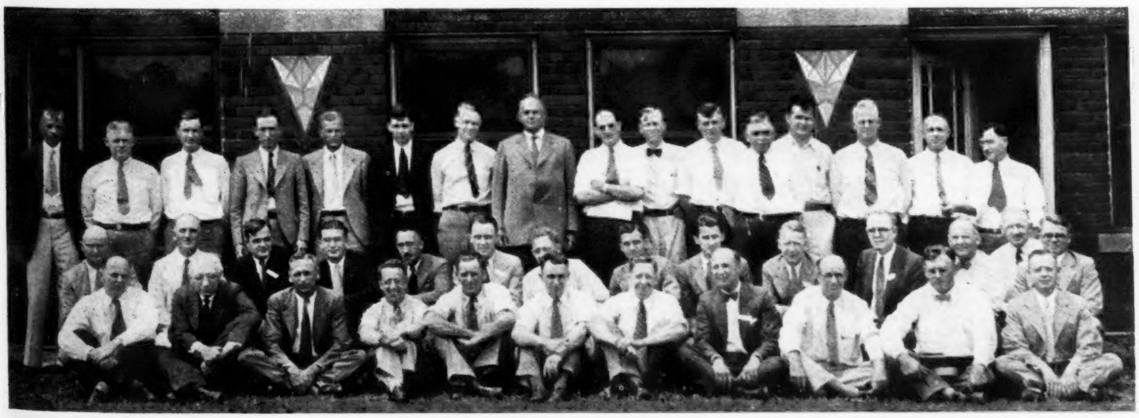
Canadian Section Organized

CANADIAN members of the American Society of Agricultural Engineers in Winnipeg, Manitoba, for a meeting of the Canadian Society of Technical Agriculturists, voted on June 15 to organize a Canadian Section of the Society.

Section officers elected at the same meeting were: Chairman, G. L. Shanks, professor of agricultural engineering, Manitoba Agricultural College; vice-chairman, J. Macgregor Smith, professor of agricultural engineering, University of Alberta; and secretary, L. G. Heimpel, professor of agricultural engineering, MacDonald College, Quebec.

Leonard J. Fletcher, recent president of the A.S.A.E., was present and encouraged the organization of the Section. The Council of the Society officially approved the new Section in action taken during the recent annual meeting at Columbus.

The new Section plans to hold its meetings in conjunction with those of the Canadian Society of Technical Agriculturists, following a plan similar to that by which the Southern and Southwest Sections have held meetings in conjunction with meetings of the Association of Southern Agricultural Workers.



Extension agricultural engineers who attended the conference on agricultural engineering extension, at Ohio State University, June 16, 17, and 18

Committee on Wood Utilization Publishes House Insulation Report

THE National Committee on Wood Utilization has recently published a report on "House Insulation: Its Economies and Application." by its subcommittee on that subject.

It is a bulletin of 52 pages, 34 figures and X chapters covering history and uses, reasons for using, types, general considerations, specific-applications, thickness recommendations, methods of applying, cost, weatherproofing, fuel savings, etc.

Through the cooperation of a group of members of the committee, a copy of the report has been mailed to each member of the A.S.A.E. Additional copies are available from the Superintendent of Documents, Washington, D. C., at 10 cents each.

Idaho C R E A Issues Eighth Progress Report

PROGRESS Report No. 8 of the Idaho Committee on the Relation of Electricity to Agriculture is a 73-page mimeographed booklet on the work of the Committee for 1931, including reports of investigations on electricity in the household; electricity in the dairy; feed grinding; electric heaters for warming stock drinking water; use of electricity in poultry production; use of artificial light in agricultural production; use of artificial light to promote plant growth; influence of light on ripening fruit; measurement of light and determination of spectral energy distribution for agricultural research; operation of S-1 sunlight lamps in series; electric soil and hotbed heating, and pumping for drainage and supplemental irrigation.

Promotes Electrification With Bulletins, Contest

TO EXTEND information on the use of electric power to additional farmers, the Puget Sound Power and Light Company has published two bulletins, entitled "Power on the Farm" and "Electric Heat for Starting and Growing Plants."

J. C. Scott, agricultural engineer for the company, reports that it was also one of the sponsors of a land clearing contest in its territory. In this connection it distributed Washington Agricultural Extension Bulletin No. 163, on "The Forced Draft Stump Burner." The winner of the contest used this method and cleared an acre of land at a cash cost of \$4.75, the charge for current used in operating the blower.

Personals of ASAE Members

J. K. Alvis is now connected with the division of agriculture and forestry of the Museum of Science and Industry, Chicago, Illinois, as technical assistant. Mr. Alvis was formerly an agricultural sales engineer of the Caterpillar Tractor Company.

Hobart Beresford, agricultural engineer, and **E. N. Humphrey,** assistant in agricultural engineering, Idaho Agricultural Experiment Station, are joint authors of Idaho Agricultural Extension Bulleitn No. 85, entitled "Harvesting Field Peas with the Combine."

Harry L. Garver, investigator for the Washington Committee on the Relation of Electricity to Agriculture, is author of Washington Agricultural Experiment Station Bulletin No. 262, on "Grain Elevating Machinery for the Palouse Country."

J. T. McAlister, extension agricultural engineer, Clemson (South Carolina) Agricultural College, is senior author of Circular 121, entitled "The Trench Silo."

C. F. Miller, agricultural engineer, National Lumber Manufacturers Association, is author of a new bulletin of that organization on "Poultry Houses and Equipment."

A. J. Schwantes of the division of agricultural engineering is joint author with G. A. Pond, division of agricultural economics, of Minnesota Agricultural Experiment Station Bulletin No. 280, on "The Farm Tractor in Minnesota."

ASAE Meetings

North Atlantic Section — Albany, New York, October 27, 28 and 29.

Power and Machinery Division — Chicago, Illinois, November 28 and 29.

Applicants for Membership

The following is a list of applicants for membership in the American Society of Agricultural Engineers received since the publication of the June issue of AGRICULTURAL ENGINEERING. Members of the Society are urged to send information relative to applicants for consideration of the Council prior to election.

Walter B. Alford, agricultural representative, E. I. du Pont de Nemours & Co., P. O. Box 580, Gulfport, Miss.

Albert J. Deniston, Jr., The Deniston Co., 4856 So. Western Ave., Chicago, Ill.

John C. Keplinger, vice-president in charge of sales, Hercules Motors Corporation, Canton, Ohio.

Lee W. Minium, instructor in agricultural engineering, South Dakota State College, Brookings, So. Dak.

Herbert S. Riesbol, junior civil engineer, U. S. Department of Agriculture, Bureau of Agricultural Engineering, Box 694, Guthrie, Okla.

New ASAE Members

Merrill B. Cann, 140 E. Market St., West Chester, Pa.

Professor Dr.-Ing C. H. Dencker, Landmaschineninstitut Landsberg (Warthe) Germany.

Lewis M. McGhee, 523 Main St., Lynchburg, Va.

John E. Nicholas, Department of Agricultural Engineering, Pennsylvania State College, State College, Pa.

Earl R. Young, Route 5, Owatonna, Minn.

EMPLOYMENT BULLETIN

An employment service is conducted by the American Society of Agricultural Engineers for the special benefit of its members. Only Society members in good standing are privileged to insert notices in the "Men Available" section of this bulletin, and to apply for positions advertised in the "Positions Open" section. Non-members as well as members, seeking men to fill positions, for which members of the Society would be logical candidates, are privileged to insert notices in the "Positions Open" section and to be referred to persons listed in the "Men Available" section. Notices in both the "Men Available" and "Positions Open" sections will be inserted for one month only and will thereafter be discontinued, unless additional insertions are requested. Copy for notices must be received at the headquarters of the Society not later than the 20th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. There is no charge for this service.

AGRICULTURAL ECONOMIST, B Sc in Agriculture with farm mechanics major, University of Nebraska, 1926; course work completed for M.S. in Agricultural Economics, University of Nebraska; three years experience with an agricultural engineering department in a western university; two years high school experience; interested in farm management. Married, two children. Now employed. MA-215.

AGRICULTURAL ENGINEER, B Sc degree in agricultural engineering from Virginia Polytechnic Institute (1931) and M S degree from Iowa State College (1932), desires a position preferably in teaching or research work in rural electrification. Will go anywhere. MA-216.

AGRICULTURAL ENGINEER, B Sc degree in agricultural engineering from Virginia Polytechnic Institute (1929) and M S degree from University of Maryland (1931), desires position in research or extension work in rural electrification or any other branch of agricultural engineering. Has been employed for two years in part-time extension and research in rural electrification. Will go anywhere. MA-217.

AGRICULTURAL ENGINEER, with farm experience, three years drainage and soil engineering work for an engineering firm, with one year as instructor in vocational agriculture, and two and one-half years as county agricultural agent, including supervising construction work, developing complete plans for farm layouts, desires position. Especially interested in farm management work with land bank or insurance company. Age 35. Married. Will go anywhere. MA-218.

AGRICULTURAL ENGINEER, with master's degree, with extensive experience in resident and extension teaching, farm management, consulting agricultural engineering practice, sales promotion and market research work for farm equipment manufacturers, desires position in research, teaching or commercial work. Will go anywhere. MA-219.